Community Climate Action Plan

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CITY OF ONTARIO

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Contents

Tables

Table **Page**

Figures

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Acronyms and Abbreviations

AB	Assembly Bill
ARB	California Air Resources Board
BAU	Business-As-Usual
BE	Building Energy
BMP	best management practice
C_2F_6	hexafluoroethane
CAA	Clean Air Act
CAFE	Corporate Average Fuel Economy
Cal-EPA	California Environmental Protection Agency
CAPTAC	Climate Action Plan Technical Advisory Committee
CCAs	Community Choice Aggregations
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CFLs	Compact Fluorescent Light bulbs
CH_4	methane
City	City of Ontario
CO_2	carbon dioxide
CO_2e	CO2 equivalent
CPUC	California Public Utilities Commission
EIR	Environmental Impact Report
EM	existing measure
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESPs	energy service providers
FED	Functional Equivalent Document
GHG	greenhouse gas
GPS	Global Positioning Systems
GWh	gigawatt hours
GWP	global warming potential
HFCs	hydrofluorocarbons
ICF	ICF International
IEUA	Inland Empire Utilities Agency
IOUs	investor-owned utilities
IPCC	Intergovernmental Panel on Climate Change
kWh	kilowatt hours
LCFS	Low Carbon Fuel Standard
LGOP	Local Governments Operations Protocol
MCAP	Municipal Climate Action Plan
MPOs	metropolitan planning organizations
MT	metric ton
MW	megawatts
N_2O	nitrous oxide
NGOs	non-governmental organizations
NO_2	nitrous oxide
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standards
ODS	ozone-depleting substances
PACE	Property Assessment for Clean Energy
PFCs	perfluorocarbons

PM	planned measure
ppb	parts per billion
ppm	parts per million
ppt	parts per thousand
PS	Performance Standard for New Development
RAD	responsible appliance disposal
RPS	Renewable Portfolio Standard
RTPs	Regional Transportation Plans
SANBAG	San Bernardino Associated Governments
SAR	Second Assessment Report
SB	Senate Bill
SCAG	Southern California Association of Governments
SCAMQD	South Coast Air Quality Management District
SCE	Southern California Edison
SCGC	Southern California Gas Company
SF_6	sulfur hexafluoride
UC	University of California
UNFCCC	United Nations Framework Convention on Climate Change
VMT	vehicle miles traveled
W	waste
WT	wastewater

CITY OF ONTARIO

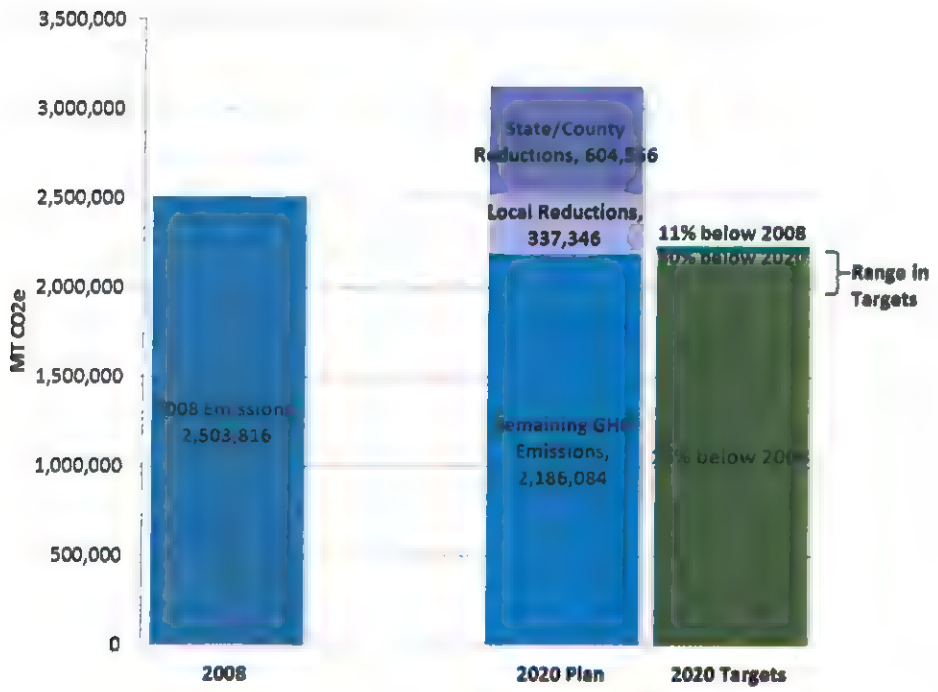
Community Climate Action Plan

Executive Summary

Executive Summary
Overview of the Community Climate Action Plan

With the approval of The Ontario Plan (TOP) and Final Environmental Impact Report (FEIR), the City of Ontario committed to the development of a Community Climate Action Plan with the GHG emissions reduction goal of 30% below business-as-usual (BAU)[1] 2020 levels. This goal is roughly equivalent to the Scoping Plan adopted by the State of California in 2008 that recommends a target of 15% below current emissions levels. The Scoping Plan was developed to implement Assembly Bill (AB) 32 and provides a recommended goal that local communities adopt a GHG reduction target of 15% below "current" (2005-2008) levels by the year 2020. Subsequently, based on the Air Resources Board's (ARB) latest GHG inventory data for California, the state would have to reduce statewide emissions by 10 – 11% (not 15%) to meet 1990 levels. As shown within Figure ES-1, the City is within the recommended target range of the Scoping Plan.

Figure ES-1. Summary of GHG Emissions Reductions and Range in Targets (MT CO_2e)



[1] Business-As-Usual for 2020 refers to no additional efficiency measures (e.g. Cal Green code, Title 24 revisions, etc.) being applied to future growth for projection purposes to determine 2020 baseline emissions.

The primary purpose of the Community Climate Action Plan (CAP) is to design a feasible strategy to reduce GHG emissions generated from community activities that is consistent with statewide Scoping Plan GHG reduction efforts. Community activities are defined as those activities occurring in association with the land uses and activities within the City's jurisdictional boundary, generally from sources of emissions that the City's community can influence or control.

To develop the CAP, a GHG inventory of community emissions for calendar year 2008 and a forecasted future-year community emissions inventory for calendar year 2020, was prepared. For a detailed description of the city's GHG inventory, see Appendix A. Simultaneous with the inventory development work, the City began reviewing the measures listed within the TOP Final EIR. Upon further research of feasible measures and refinements, a listing of candidate measures was selected and analyzed in greater detail. Based on each measure's reduction effectiveness and feasibility to reduce emissions, the draft list of measures was developed for inclusion in this CAP.

City of Ontario Community Greenhouse Gas Emissions

The City of Ontario has committed to preparing both a community climate action plan and a municipal climate action plan. Emissions generated by the City's municipal operations are encapsulated in the overall community emissions inventory (i.e., most municipal emissions are a small subset of the larger community emissions).

The 2008 inventory of community GHG emissions was calculated for sectors identified by AB 32. This 2008 inventory is a baseline from which to forecast future-year (2020) emissions and establish GHG reduction targets. The 2020 emissions estimate, or forecast, represents *business as usual* (BAU) emissions and does not take into account any new reduction measures. The GHG emissions inventory was developed using methods and procedures approved by the state and local air quality management agencies. The primary protocols consulted for the analysis were as follows:

- Local Governments Operations Protocol (LGOP) for the quantification and reporting of greenhouse gas emissions inventories (California Air Resources Board 2010b).
- 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories (IPCC 2006).
- 2009 General Reporting Protocol (Version 3.1) for reporting entity-wide GHG emissions (California Climate Action Registry 2009).
- 2012 ICLEI U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (ICLEI 2012).

As is the standard practice, the GHG inventory is presented in metric tons (MT) of CO_2 equivalent (CO_2e) in all figures and tables, unless otherwise denoted. Presenting inventories in CO_2e allows one to characterize the complex mixture of GHG as a single unit, taking into account that each GHG has a different global warming potential (GWP).

GHG emissions can be defined as either direct (emissions that occur at the end use location, such as natural gas combustion for building heating) or indirect (emissions that result from consumption at the end use location but occur at another location, such as emissions that occur at the power plant itself but result from residential electricity use of in-home appliances or other uses). This report addresses both types of emissions.

In 2008, the City's community activities resulted in the release of approximately 2.5 million MT CO_2e—roughly equivalent to the amount of GHGs released by the consumption of more than 280 million gallons of gasoline. In 2008, the largest source of emissions, representing 38% of the inventory, was emissions associated with on-road transportation (~940,000 MT CO_2e). The second largest source of emissions was from building energy use (~930,000 MT CO_2e; 37%).

Under business-as-usual conditions, emissions associated with community activities are projected to increase to 3.1 million MT CO_2e by 2020—an increase of approximately 25% over 2008 levels. On-road transportation and building energy use are expected to remain the largest sources of emissions in 2020 (Table ES-1).

Table ES-1. City of Ontario Community GHG Inventories: 2008 Baseline and 2020 BAU Forecast (MT CO2e)[a]

	2008		2020	
Emissions Sector	**MT CO_2**	**% of Total**	**MT CO_2**	**% of Total**
Building Energy Use	928,409	37%	1,237,006	40%
On-Road Transportation	942,020	38%	1,219,767	39%
Off-Road Equipment	176,314	7%	229,069	7%
Agriculture	356,131	14%	323,390	10%
Solid Waste Management	60,000	2%	64,326	2%
Wastewater Treatment	6,587	0.3%	8,781	0.3%
Water Transport, Distribution, and Treatment	29,044	1%	38,575	1%
SF_6 from Electricity Consumption[b]	5,310	0.2%	7,072	0.2%
Total Emissions	**2,503,816**	**100%**	**3,127,987**	**100%**
Excluded Emissions[c]				
Stationary Sources	405,195	N/A	511,548	N/A
Airport-Related Traffic	28,736	N/A	75,976	N/A
Subtotal Excluded Emissions	**433,932**	**N/A**	**587,525**	**N/A**

Values may not sum due to rounding. For a detailed description of the city's 2008 GHG inventory and 2020 forecast, see Appendix A.

[a] The calculations presented above contain a certain amount of uncertainty. Quantitative error analyses are complicated, require detailed statistical equations, and are outside the scope of the consultant's work. The U.S. Environmental Protection Agency (EPA) estimates an error range of -1% to 6% for the 2009 national inventory. Given that the City's 2008 inventory employed similar methods and analysis factors, a similar level of error can be expected, yielding an emissions range of 2,478,778 MT CO_2e to 2,654,045 MT CO_2e. The uncertainty associated with the 2020 forecast is likely higher due to the assumptions associated with future socioeconomic data.

[b] SF_6 = sulfur hexafluoride

[c] The City elected not to include these emissions in its inventory. Amounts are provided for informational purposes only and were not used to develop the CAP reduction goal.

City of Ontario Greenhouse Gas Reduction Plan

The City of Ontario has committed to a greenhouse gas emissions reduction target of 30% below business-as-usual 2020 levels, through the development of a Community Climate Action Plan (CAP). The measures described in this CAP would, if fully implemented, result in 2020 emissions of 30% below 2020 business-as-usual levels, with reductions of approximately 942,000 MT CO_2e.

The City's Community CAP includes existing state measures and existing and proposed local measures that would result in GHG emissions reductions from 2008-2020.[2] Existing programs that affected emissions in 2008 were already incorporated into the GHG inventory and forecast. Any reductions from existing or planned programs in the CAP come from actions not implemented yet in 2008. State mandates do not require additional local legislative or administrative action (e.g., approving any new or additional regulations), but would result in local GHG reductions and would often require local effort to implement state mandates. To supplement statewide initiatives, the City has identified a series of reduction measures that are either currently being implemented or would be implemented by the City before 2020. The reduction measures are grouped into nine broad sectors that would affect emissions throughout community activities. The measures include programs that improve building energy efficiency, increase use of renewable energy, reduce water consumption, reduce waste, and other measures. A summary of the community GHG reduction measures selected for inclusion in the Community CAP are presented in Table ES-2. This table presents the measure name and a simple definition of each. The definition is based on the practical application of each measure, and indicates the action necessary in order to achieve each measure. The official measure descriptions are presented in Chapter 3. For a detailed description of the City's GHG reduction measures, including quantification methods, sources and assumptions, see Appendix C.

Approximately 64% of the reductions needed to achieve the City's GHG reduction goal are achieved through state- and county-level programs, and 36% through City-level programs. The largest GHG reductions are identified in the areas of building energy (both energy efficiency and renewable energy), agriculture, and transportation (Table ES-2 and Figure ES-2).

The measures described in this Community CAP outline a path for reducing community emissions in conjunction with planned state actions. When combined with state efforts, the GHG reduction measures described in the City's Community CAP would enable the City to reduce its GHG emissions by an estimated 942,000 MT CO2e, which meets the emissions reduction target of 30% below 2020 levels. Actions not currently quantified, as well as local effects of the state's cap-and-trade program,[3] will likely contribute additional reductions to the City's goal.

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[2] Currently, the only federal mandate that would specifically reduce GHG emissions in Ontario are the Corporate Average Fuel Economy (CAFE) standards. These standards were adopted to be consistent with previously passed California vehicle efficiency standards per AB 1493 (Pavley). As a result, these standards are subsumed in the state regulations.

[3] The effects of California's cap-and-trade system, which took effect in 2013, are not included in the analysis in this CAP. However, it is expected that by 2020, the cap-and-trade system will result in additional reductions in the building energy and transportation sectors due to changes in energy prices directly (at the consumer level) or indirectly (at the producer level). It has been estimated that the cap-and-trade system might result in the following energy price changes by 2020: electricity increase of 1 to 3%, natural gas increase of 7 to 16%, gasoline increase of 4 to 8%, and diesel increase of 2 to 4% (California Air Resources Board 2010b). Consumer response to these changes in energy prices might result in additional reductions in building energy and transportation fuel consumption beyond those included in estimates of the state and local measures included in this CAP, but are not estimated at this time.

Table ES-2. Summary of Community GHG Reduction Measures

Measure Name	Measure Description
Performance Standard For New Development	
PS-1	**Performance Standard for New Development**: New projects emitting more than 3,000 MT CO_2e per year need to reduce emissions by 25%.
BMP-1	**Performance Standard for New Development; Best Management Practices**: New projects emitting less than 3,000 MT CO_2e per year to exceed Title 24 Energy Efficiency Standards by at least 5%, or equivalent level of GHG emission reduction.
Building Energy	
Energy-1	**CAP Consistency:** Ensure that the City's local Climate Action, Land Use, Housing, and Transportation Plans are aligned with, support, and enhance any regional plans that have been developed consistent with state guidance to achieve reductions in GHG emissions.
Energy-2	**Regional Cooperation:** Coordinate with special districts, nonprofits, and other public organizations to share resources, achieve economies of scale, and develop green building policies and programs that are optimized on a regional scale.
Energy-3	**Energy Efficiency Funding for Existing Low-Income Residents**: Partner with community services agencies to fund energy efficiency projects, including heating, ventilation, air conditioning, lighting, water heating equipment, insulation, and weatherization, for low income residents. Provide permitting-related and other incentives for energy efficient building project.
Energy-4	**Energy Efficiency Incentives and Programs to Promote Retrofits for Existing Residential Buildings:** Incentivize, or otherwise support, voluntary energy efficiency retrofits of existing residential buildings to achieve reductions in natural gas and electricity usage. Adopt standards and/or promote voluntary programs that retrofit indoor lights, electric clothes dryers, energy-star thermostats, window seals, duct sealing, air sealing, and attic insulation.
Energy-5	**Energy Efficiency Incentives and Programs to Promote Retrofits for Existing Non-Residential Buildings:** Voluntary programs for existing non-residential facilities improve building-wide energy efficiency by 20% by 2020.
Energy-6	**Streetlights**: Adopt outdoor lighting standards to reduce electricity consumption. Require 40% reduction in energy use from traffic signals and streetlights by 2020.
Renewable Energy	
Renewable Energy-1	**Solar Installation for Existing Non-Residential for Major Rehabilitations or Expansions:** Install solar photovoltaic panels on nonresidential buildings greater or equal to 25,000 square feet in size requiring discretionary permits for major rehabilitations or expansions (additions of 25,000 square feet of office retail/commercial or 100,000 square feet of industrial/warehouse floor area).
Renewable Energy-2	**Solar Installation in Existing Single Family Housing:** Install solar panels on 22% of existing single-family homes by 2020.
Renewable Energy-3	**Solar Installation in Existing Nonresidential Buildings:** Install solar panels on 32% of existing nonresidential buildings by 2020.

Measure Name	Measure Description
Wastewater Treatment	
Wastewater-1	**Recycled Water:** Require 50% of all water used for non-potable sources to be recycled water by 2020. Require all new parks and schools to use 100% recycled water for non-potable outdoor uses, as feasible. Develop public educational materials that support and encourage the use of recycled water. Adopt a City Municipal facility goal of 50% use of recycled water for non-potable sources.
Wastewater-2	**Waste-to-energy/Methane Recovery:** Encourage Inland Empire Utilities Agency (IEUA) to implement waste-to-energy projects at the IEUA RP-1 wastewater treatment plant by 2020, and to utilize collected gas to fuel onsite stationary sources.
Solid Waste Management	
Waste-1	**Waste Diversion:** Divert 75% of city-generated waste from landfills.
Waste-2	**Construction and Demolition Waste Recovery Ordinance:** Implement an ordinance requiring building projects to recycle or reuse at least 50% of unused or leftover building materials.
On-Road Transportation	
Trans-1	**Expand Public Transportation Infrastructure:** Work with appropriate agencies to create an interconnected transportation system that allows a shift in travel from private passenger vehicles to alternative modes, including public transit, ride sharing, car-sharing, bicycling, and walking.
Trans-2	**Transit Frequency and Speed:** To the extent feasible, support shorter transit passenger travel time through reduced headways and increased speed. Support regional transit operator to reduce average fleet travel time by 5 minutes.
Trans-3	**"Smart Bus" Technology**: Collaborate with LA Metro, Metrolink, and Omnitrans to implement "Smart Bus" technology.
Trans-4	**Expand Public Transportation Participation:** Collaborate with regional transit operator on programs to increase use of the City's public transportation system.
Trans-5	**Low- and Zero-Emission Vehicles:** Support and promote the use of low-and zero-emission vehicles in the City.
Trans-6	**Vehicle Idling**: Prohibit idling of Heavy Duty Trucks (greater than 26,000 gross vehicle weight) for longer than 3 minutes.
Trans-7	**Parking Policy:** Adopt a comprehensive parking policy that encourages carpooling and the use of alternative transportation, including providing parking spaces for car-share vehicles at convenient locations accessible by public transportation. Consider requirements for the following to reduce vehicle miles traveled (VMT) within the City by 2%. Designate 5% of downtown parking spaces for ride-sharing vehicles.
Trans-8	**Event Parking:** Consider establishing policies and programs to reduce onsite parking demand and promote ride-sharing during events at the Ontario Convention Center and other event venues. Consider a goal to reduce VMT at major events by 2%.
Trans-9	**Roadway Management:** Implement traffic and roadway management strategies to improve mobility and efficiency, and reduce associated emissions. Consider a goal to reduce community vehicle fuel consumption by 2%.

Measure Name	Measure Description
Trans-10	**Signal Synchronization:** Evaluate potential efficiency gains from further signal synchronization. Synchronize traffic signals throughout the City and with adjoining cities while allowing free flow of mass transit systems. Require continuous maintenance of the synchronization system. Consider a goal to reduce City-wide vehicle fuel consumption by 2%.
Trans-11	**School Transit Plan:** Encourage local school districts to develop school transit plans to substantially reduce automobile trips to, and congestion surrounding, schools. (According to some estimates, parents driving their children to school account for 20–25% of the morning commute.) Plans may address, e.g., necessary infrastructure improvements and potential funding sources, replacing older diesel buses with low or zero-emission vehicles, mitigation fees to expand school bus service, Safe Routes to School programs, and other formal efforts to increase walking and biking by students. Although this measure is not within the City's authority, Ontario can work with local school districts to develop these plans.
Trans-12	**Ridesharing Programs:** Coordinate with local agencies to promote ride sharing programs in Ontario (CAPCOA 2010). Although the City does not have the legal authority to impose trip demand management programs on project applicants or employers, Ontario can work with local agencies to develop these programs. Consider a goal to reduce City-wide VMT by 2% through mode-shifts from single-occupancy vehicles to carpools. Facilitate employment opportunities that minimize the need for private vehicle trips. The City could also work with the County to participate in their rideshare measure, which includes exploring financial programs for the purchase or lease of rideshare vehicles, encouraging community car sharing through city employers, and encouraging creation of community rideshare incentives (gas cards, commuter-tax benefits, guaranteed ride home programs, etc.).
Trans-13	**Bicycle and Pedestrian Infrastructure Plan:** Adopt a comprehensive bicycle and pedestrian infrastructure plan to expand the City's bicycle and pedestrian network. This plan would encourage residents and employees to use bicycles and walking as a method of transportation. Consider a goal to reduce City-wide VMT by 2% through mode-shifts from single-occupancy vehicles to bicycles.
Trans-14	**Development Standards for Bicycles:** Establish standards for new development and redevelopment projects to support bicycle use. Consider a goal to reduce VMT resulting from new development by 4% through mode-shifts from single-occupancy vehicles to bicycles.
Trans-15	**Smart Growth and Infill:** Encourage high-density, mixed-use, infill development and creative reuse of brownfield, under-utilized and/or defunct properties within the urban core. Consider a goal to reduce VMT resulting from new development by 5%.
Trans-16	**Transit-Oriented Development:** Identify transit centers appropriate for mixed-use development, and promote transit-oriented, mixed-use development within these targeted areas. Consider a goal to reduce VMT resulting from new development by 2%.
Off-Road Equipment	
Off Road-1	**Idling Ordinance:** Prohibit idling of heavy duty off-road construction vehicles to no more than 3 minutes.
Off Road-2	**Landscaping Equipment:** Support landscape equipment replacement programs to replace 75% of all landscaping equipment with electric equipment (945 total pieces of landscaping equipment replaced).

Measure Name	Measure Description
Agriculture	
Agriculture-1	**Methane Emissions Reduction for Animal Operations:** Support dairies (and other animal operations) to consider existing and new technologies and methods to control emissions from enteric fermentation and manure management and assess the feasibility and cost effectiveness of these technologies. Animal operations should strive to capture as much methane from manure management as feasible. Captured biogas can also be used in place of natural gas for heating, converted to vehicle fuel, used to replace gasoline and diesel, or combusted in a generator to produce renewable electricity.
Water Transport, Distribution, and Treatment	
Water-1	**Water Conservation for Existing Buildings:** Implement a program to renovate existing buildings to a higher level of water efficiency. Require 25% of existing buildings within the community to achieve a 25% reduction in water use. This measure will reduce both indoor and outdoor water use.
Water-2	**Irrigation Monitoring and Management System (Outdoor):** Install water monitoring and management systems (Smart controllers, etc.) across the community to reduce irrigation water needs and reduce the City's total community-wide water consumption by 10% by 2020. This measure will reduce outdoor water use.
Water-3	**Water System Efficiency:** Maximize efficiency at drinking water treatment, pumping, and distribution facilities, including development of off-peak demand schedules for heavy commercial and industrial users. Design and implement peak load management and demand response programs for water supply, treatment, and distribution, including interface with existing automated systems for building energy management and supervisory control and data acquisition (SCADA) systems.
Water-4	**SB X7:** Urban water agencies throughout California are required to increase water conservation to achieve a statewide goal of a 20% reduction in urban per capita use by 2020 per SB X7. The Ontario 2010 Urban Water Management Plan outlines the approaches to achieving that reduction.
Miscellaneous	
Misc-1	**Climate Change Awareness:** Utilize a variety of media outlets to promote climate change awareness and GHG reduction.
Misc-2	**Carbon Sequestration:** Establish a City-wide carbon sequestration project and sequestration goal of 1,000 metric tons of CO_2 per year.
Misc-3	**Shade Tree Planting:** Plant 1,000 trees per year from 2012–2020 for a total of 9,000 trees by 2020.
Misc-4	**Refrigeration and Air Conditioning Disposal:** Institute an ordinance requiring residences, businesses, and city facilities to practice responsible appliance disposal (RAD) for all decommissioned units, including refrigerators/freezers, window air-conditioning units, and dehumidifiers.
Misc-5	**Pervious Paving:** Promote the use of pervious concrete for pavement projects. Explore grant funding opportunities for pervious concrete.
Misc-6	**Infiltration:** Promote onsite infiltration, as required by the National Pollutant Discharge Elimination System (NPDES) Permit. Promote the use of pervious concrete and asphalt for pavement and parking lot projects.

Table ES-3. Summary of GHG Reductions—Sector View

GHG Emissions Sector	GHG Emission Reductions (MT CO_2e)	Percent Reduction in Sector
Building and Renewable Energy[a]	393,300	31.8%
On-Road Transportation[b]	365,212	29.9%
Off-Road Equipment[b]	28,166	12.3%
Solid Waste Management[c]	26,265	40.8%
Wastewater[d]	649	7.4%
Water Transport, Distribution, and Treatment[e]	6,511	16.9%
Agriculture	80,352	24.8%
SF_6 From Electricity Consumption[f]	1,678	23.7%
Performance Standard for New Development[g]	39,769	N/A
Projected Measure Reduction 2020 Totals	**941,902**	**N/A**
30% Reduction Target	***938,396***	
Exceeds Reduction Target	***3,506***	
% Below Projected Levels	***30.1%***	

For a detailed description of the City's GHG reduction measures, including quantification methods, sources and assumptions, see Appendix C.

[a] Includes GHG benefits from the Renewables Portfolio Standard (state), energy conservation measures, increased use of renewable power sources, shade tree planting, and reductions in building energy use related to wastewater treatment measures (increased wastewater treatment operational efficiency) and water conservation measures. When water consumption in buildings is reduced, and much of that water would have been heated (dishwashing, clothes washing, sinks, showers, etc.) using natural gas or electric heaters, building energy use is reduced at the same time.

[b] Includes GHG benefits from the Low Carbon Fuel Standard.

[c] Includes GHG benefits from San Bernardino County Landfill Methane Capture Systems (County-1).

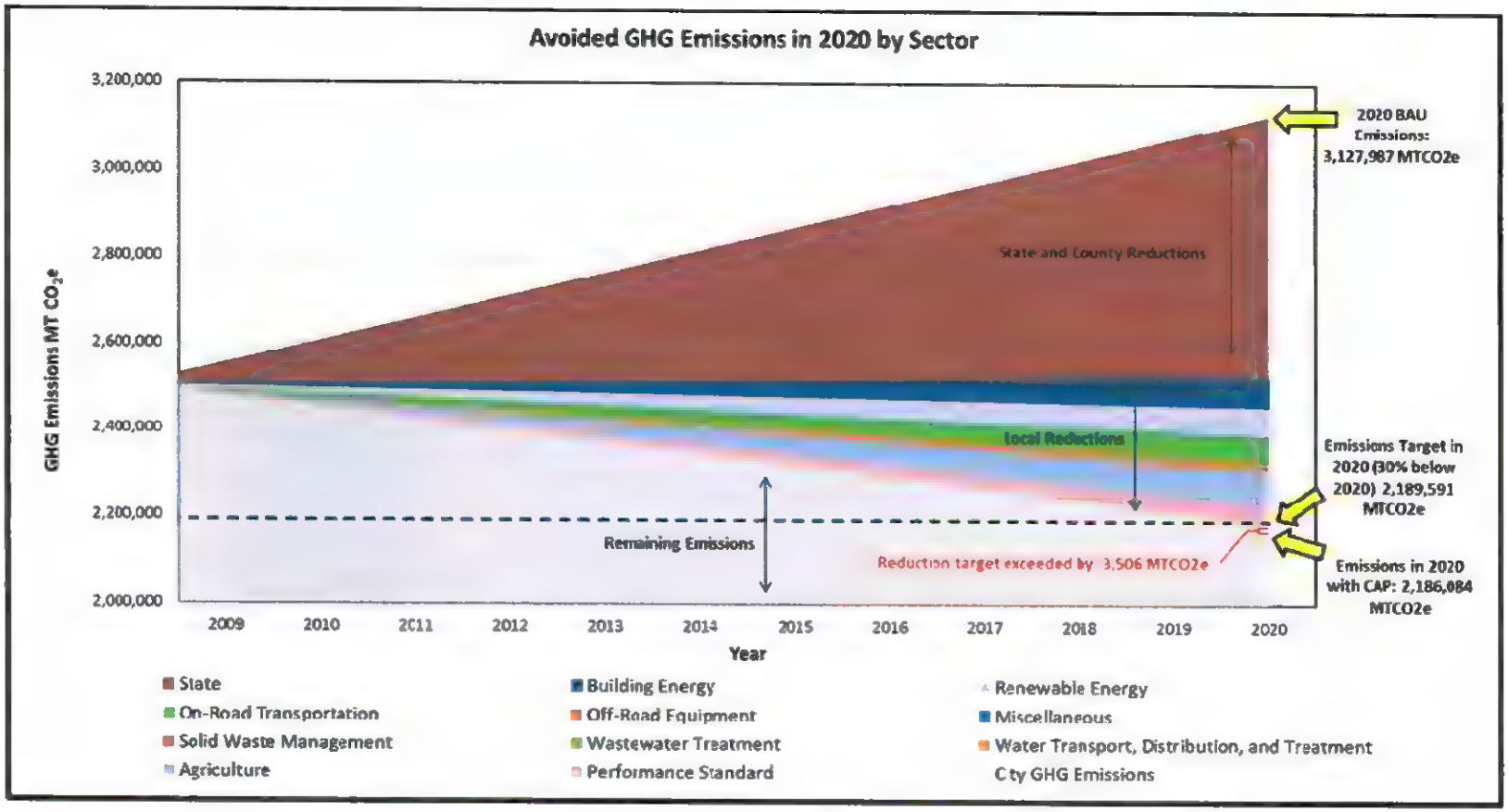
[d] Includes reductions in wastewater treatment fugitive emissions only.

[e] Includes GHG benefits from embedded energy savings from water transport, distribution, and treatment.

[f] Includes reductions in SF_6 due to any measure that reduces grid electricity.

[g] Not a sector of the inventory.

Figure ES-2. Summary of GHG Emissions Reductions by Sector (MT CO_2e)



Relationship to the City's Municipal Climate Action Plan

The primary purpose of the City's Municipal Climate Action Plan (MCAP) was to design a feasible strategy to reduce GHG emissions generated by the City's municipal operations (e.g., City-owned facilities, vehicle fleets) consistent with the goal of a 30% reduction of GHG emissions by year 2020. The MCAP includes a GHG inventory of municipal emissions for calendar year 2008 and a forecasted future-year municipal emissions inventory for calendar year 2020. Simultaneous with the inventory development work, the City selected candidate measures based on each measure's reduction effectiveness and feasibility. When combined with state efforts, the GHG reduction measures described in the City's MCAP would enable the City to reduce its municipal GHG emissions by an estimated 10,000 MT CO_2e, which exceeds the emissions reduction target of 30% below 2020 levels or approximately 8,500 MT CO_2e.

The majority of emissions generated by the City's municipal operations are encapsulated in the overall community emissions inventory detailed in this Community CAP (i.e., municipal emissions are a small subset of the larger community emissions). While those reduction measures detailed in the MCAP would solely address municipal emissions, the measures detailed in this Community CAP would address community-wide activities (those activities occurring in association with the land uses and activities within the City's jurisdictional boundary).

Relationship to California Environmental Quality Act

In order to comply with the California Environmental Quality Act (CEQA), the environmental impacts of this Community CAP must be analyzed, and any potentially significant impacts must be reduced to the extent feasible. The City of Ontario has adopted The Ontario Plan FEIR that includes a programmatic GHG analysis of mitigation measures set forth under Mitigation Measures 6-1 through 6-6. Consistent with CEQA (Public Resources Code section 21000 et seq.) and the State CEQA Guidelines (Title 14 of the California Code of Regulations section 15000 et seq.) Ontario proposes to tier the environmental review of this Community CAP from the previously adopted TOP FEIR. The previously adopted TOP FEIR addressed development impacts in Ontario comprehensively and a review of the potential secondary environmental impacts of implementation of the Community CAP does not indicate that it would result in any new significant environmental impacts or substantially more severe environmental impacts than already disclosed in the adopted TOP FEIR.

Future projects within the City limits must also comply with CEQA. However, once this Community CAP is adopted, analysis of environmental impacts associated with greenhouse gas emissions must simply prove project compliance with the Community CAP, rather than produce the traditional analysis of all GHG emissions associated with the proposed project and project compliance with all relevant policies and regulations. This approach is allowed per CEQA Guidelines Section 15183.5, which specifically set forth the requirements for comprehensive greenhouse gas reduction plans and tiering of analysis for project CEQA compliance.

Implementing the Plan

The success of the Community CAP will depend on cooperation, commitment, and participation by stakeholders and all City departments. To that end, the City has developed an implementation plan that creates an infrastructure for ensuring the goals of the Community CAP are achieved.

In January 2011, the Climate Action Plan Technical Advisory Committee (CAPTAC) was formed. The 16-member CAPTAC is composed of department directors and managers designated by the heads of each City agency and responsible for development and implementation of the Community CAP. The CAPTAC is charged with assessing and refining the measures identified in the Community CAP.

In addition to formation of the CAPTAC, the City identified the need for a sustainability position to coordinate City efforts and the development of the Community CAP. The City appointed a Sustainability Program Manager in July 2010 to coordinate and implement the Community CAP efforts and sustainability programs.

The City recognizes that implementation of the Community CAP will require interagency collaboration coupled with strategic public funding by the City, regional government agencies, and the state for capital projects and outreach and education efforts. The City has committed to engaging in such collaboration and will continue to seek funding for those implementation measures not yet funded.

Regular monitoring is important to ensure programs are functioning as they were originally intended. The CAPTAC will be responsible for developing monitoring procedures and amending the Community CAP as opportunities arise. Each department will be responsible for specific Community CAP measure monitoring and will provide regular reports that track GHG emission reductions to the CAPTAC.

Consistent with the 2010 Certified EIR for TOP, the City will conduct periodic comprehensive reviews of the Community CAP on a 3-year schedule that will involve an appropriate level of re-inventorying of emission sources in order to obtain a more complete understanding of GHG conditions and results of Community CAP measure progress. The City shall update this Community CAP every three years, to incorporate improved methods, better data, and more accurate tools and methods, and to assess progress. If the City is not on-schedule to achieve the GHG reduction targets of the Community CAP, additional measures shall be implemented.

Community Climate Action Plan

Chapter 1: Overview

Chapter 1
Overview

1.1 Background

This document is the City of Ontario Community Climate Action Plan (CAP) for reducing greenhouse gas (GHG) emissions associated with community activities to a level that is 30% below projected 2020 levels. This CAP demonstrates that the City of Ontario (City) is doing its fair share to assist the state of California in reaching its GHG reduction goals by 2020 as set forth in State regulations (Assembly Bill [AB] 32). This CAP includes the following.

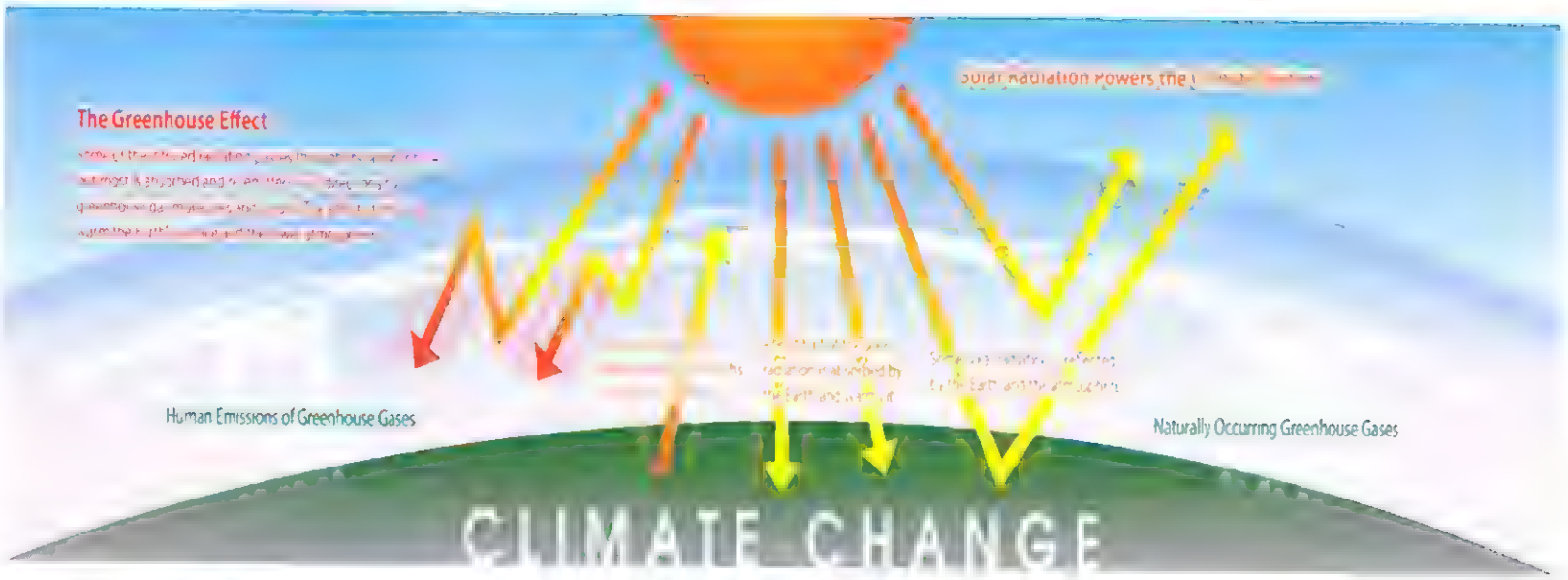
- Basic information about the science of climate change and a summary of state and federal level regulatory activity related to GHG emissions.
- An inventory of all GHG emissions that result from community activities in the City in 2008 (the baseline year).
- A projection of the GHG emissions that would result from community activities in the City in 2020 if the City or the state took no additional action to reduce emissions (the *business as usual* [BAU] forecast).
- A list of measures/programs that will likely be taken by the state and the City that will result in lower GHG emissions in 2020 than were projected.
- A prioritization of measures/programs that the City can pursue in order to reduce its emissions such that the CAP can be used as a decision-making tool.
- Recommendations for implementation, next steps, and future updates to this CAP.

1.1.1 Description of Greenhouse Gases

The temperature on Earth is regulated by a system commonly known as the "greenhouse effect," a natural process through which heat is retained in the troposphere. Greenhouse gases present in the Earth's lower atmosphere play a critical role in maintaining the Earth's temperature as they trap some of the long wave infrared radiation emitted from the Earth's surface that would otherwise escape to space, as shown in Figure 1-1. The Intergovernmental Panel on Climate Change (IPCC), state of California AB 32, and California Environmental Quality Act (CEQA) Guidelines define the following six GHGs in order of most abundance: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (NO_2), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Water vapor, although the most abundant GHG, is not included in this list because natural concentrations and fluctuations far outweigh anthropogenic influences. The sources and sinks[4] of each of these gases are discussed in detail below. Generally, GHG emissions are quantified in terms of metric tons (MT) of carbon dioxide equivalents (CO_2e) emitted per year.

[4] A sink removes and stores GHGs in another form. For example, vegetation is a sink because it removes atmospheric CO2 during respiration and stores the gas as a chemical compound in its tissues.

Figure 1-1. The Greenhouse Effect



To simplify reporting and analysis, methods have been set forth to describe emissions of GHGs in terms of a single gas, CO_2. GHGs are compared in terms of their respective global warming potentials (GWP), relative to that of CO_2 (which has a GWP standardized to 1). The GWP is used to compare GHGs based on their potential to trap heat and remain in the atmosphere, as shown in Table 1-1. Some gases, like methane, can absorb more heat than others, and thus have a greater impact related to greenhouse effects. When developing actions to reduce GHGs, it is therefore important to not only consider the abundance of a gas, but also its GWP (Intergovernmental Panel on Climate Change 2007).

Table 1-1. Lifetimes, Global Warming Potentials, and Abundances of Several Significant Greenhouse Gases

Gas	Global Warming Potential (100 years)	Lifetime (years)	Atmospheric Abundance
CO_2	1	50–200	393 ppm
CH_4	21	9–15	1,758-1,874 ppb
N_2O	310	120	323-324 ppb
HFC-23	11,700	264	18 ppt
HFC-134a	1,300	14.6	35 ppt
HFC-152a	140	1.5	3.9 ppt
CF_4	6,500	50,000	74 ppt[a]
C_2F_6	9,200	10,000	2.9 ppt[a]
SF_6	23,900	3,200	7.1-7.5 ppt

Sources: Intergovernmental Panel on Climate Change 1996, 2007; Carbon Dioxide Information Analysis Center 2013; National Oceanic & Atmospheric Administration 2013.

[a] CF_4 and C_2F_6 are PFCs. The GWP values presented above are based on the IPCC Second Assessment Report (SAR) and United Nations Framework Convention on Climate Change (UNFCCC) reporting guidelines (IPCC 1996, UNFCCC 2003). Although the IPCC Fourth Assessment Report (AR4) presents different GWP estimates, the current inventory standard relies on SAR GWPs to comply with reporting standards and consistency with regional and national inventories.

N_2O = nitrous oxide; C_2F_6 = hexafluoroethane; ppm = parts per million; ppb = parts per billion; ppt = parts per thousand.

GHGs are both naturally occurring and anthropogenic (i.e., human-made). Below are descriptions of the greenhouse gases.

CO_2 is the most important anthropogenic GHG and accounts for more than 75% of all GHG emissions caused by humans. Its long atmospheric lifetime ensures that atmospheric concentrations of CO_2 will remain elevated for decades even after mitigation efforts to reduce GHG concentrations are promulgated (Intergovernmental Panel on Climate Change 2007). Primary sources of anthropogenic CO_2 in the atmosphere are the burning of fossil fuels (including motor vehicles), gas flaring, cement production, land use changes, and deforestation.

CH_4, the main component of natural gas, is the second most abundant GHG, and has a GWP of 21 (Intergovernmental Panel on Climate Change 1996). Sources of anthropogenic emissions of CH_4 include agricultural practices, combusting natural gas, and landfill outgassing.

N_2O is a powerful GHG, with a GWP of 310 (Intergovernmental Panel on Climate Change 1996). Anthropogenic sources of N_2O include agricultural processes, nylon production, fuel-fired power

plants, nitric acid production, and vehicle emissions. In the United States more than 70% of N_2O emissions are related to agricultural soil management practices, particularly fertilizer application.

HFCs are anthropogenic chemicals used in commercial, industrial, and consumer products and have high GWPs (U.S. Environmental Protection Agency 2006). HFCs are generally used as substitutes for ozone-depleting substances (ODS) in automobile air conditioners and refrigerants. The most abundant HFCs, in descending order, are HFC-134a, HFC-23, and HFC-152a (Table 1-1).

PFCs are anthropogenic chemicals emitted largely from aluminum production and semiconductor manufacturing processes. PFCs are extremely stable compounds that are destroyed only by very high-energy ultraviolet rays, which results in their very long lifetimes.

SF_6, another anthropogenic chemical, is used as an electrical insulating fluid for power distribution equipment, in the magnesium industry, and in semiconductor manufacturing; and also as a trace chemical for the study of oceanic and atmospheric processes (U.S. Environmental Protection Agency 2006).

1.1.2 Emissions Sources in the United States and California

In the United States, 84% of GHG emissions are in the form of carbon dioxide, 9% are methane, and 5% are nitrous oxide; all are the result of the burning of fossil fuels. The remaining 2% of emissions are fluorinated gases (U.S. Environmental Protection Agency 2013). Fossil fuels are burned to create electricity that powers homes and commercial buildings, to create heat, and to power vehicles. In the United States, vehicle emissions represent approximately 28% of all emissions in 2011 (U.S. Environmental Protection Agency 2013). Vehicle emissions represented approximately 38% of all GHGs emitted by Californians in 2011. Energy used to power buildings is the other primary source of GHGs in the United States and California. Other sources of GHG emissions include agriculture, land clearing, the landfilling of waste, refrigerants, and certain industrial processes.

1.1.3 Impacts of Climate Change on the City of Ontario

Increases in the globally averaged atmospheric concentration of GHGs will cause the lower atmosphere to warm, in turn inducing a myriad of changes to the global climate system. These large-scale changes will have unique and potentially severe impacts in the western United States, California, and the region surrounding the City. Current research efforts coordinated through the California Air Resources Board (ARB), California Energy Commission (CEC), California Environmental Protection Agency (Cal-EPA), University of California (UC) system, and others are examining the specific changes to California's climate that will occur as the Earth's surface warms.

Existing evidence indicates that climate change could affect the natural environment in the City in the following ways, among others. It is important to note that these impacts are predictions based on the best available evidence and are not definitive, as there are uncertainties associated with utilizing research on global and regional climate change to predict local effects.

- Extreme heat conditions, such as heat waves and very high temperatures, which could last longer and become more frequent.
- An increase in heat-related human deaths, infectious diseases, and a higher risk of respiratory problems caused by deteriorating air quality.
- Reduced water supplies for all end uses.

- Potential increase in the severity of winter storms, affecting peak stream flows and flooding.
- Changes in growing season conditions that could affect agriculture, causing variations in crop quality and yield.
- Changes in distribution of plant and wildlife species due to changes in temperature, competition from colonizing species, changes in hydrologic cycles, changes in sea levels, and other climate-related effects.
- Decreased Sierra Nevada snowpack and altered timing and amount of snowmelt; effects on California water supplies and water management (California Energy Commission 2005).

1.2 Climate Change Regulation

1.2.1 Federal and State Legislation

Although there is currently no federal overarching law or policy related to climate change or the regulation of GHGs, recent activity indicates that the U.S. Environmental Protection Agency (EPA) will take a lead role in regulating certain sources. Foremost among recent developments has been the EPA's progress in developing GHG regulations pursuant to its authority under the Clean Air Act which is further described in Table 1-2. The federal government has already adopted aggressive vehicle mileage standards. Regulation of stationary sources (such as refineries and electricity generation plants) while being pursued by the current administration remains somewhat uncertain, and will likely be subject to legal appeal on its road to implementation.

The State of California has adopted legislation, and regulatory agencies have enacted policies, addressing various aspects of climate change and GHG emissions mitigation. Much of this legislation and policy activity is not directed at citizens or jurisdictions but rather establishes a broad framework for the State's long-term GHG mitigation and climate change adaptation program. The prior and current Governor has also issued several executive orders related to the State's evolving climate change policy. Of particular importance to local governments is the direction in the AB 32 Scoping Plan that recommends local governments reduce their GHG emissions by a level consistent with state goals (i.e., 15% below current levels, since adjusted to between 10 to 11%).

Summaries of key policies, legal cases, regulations and legislation at the federal and state levels that are relevant to the City are provided in Table 1-2. Figure 1-2 displays a timeline of key state and federal regulatory activity.

Table 1-2. Summary of Federal and State Legislation

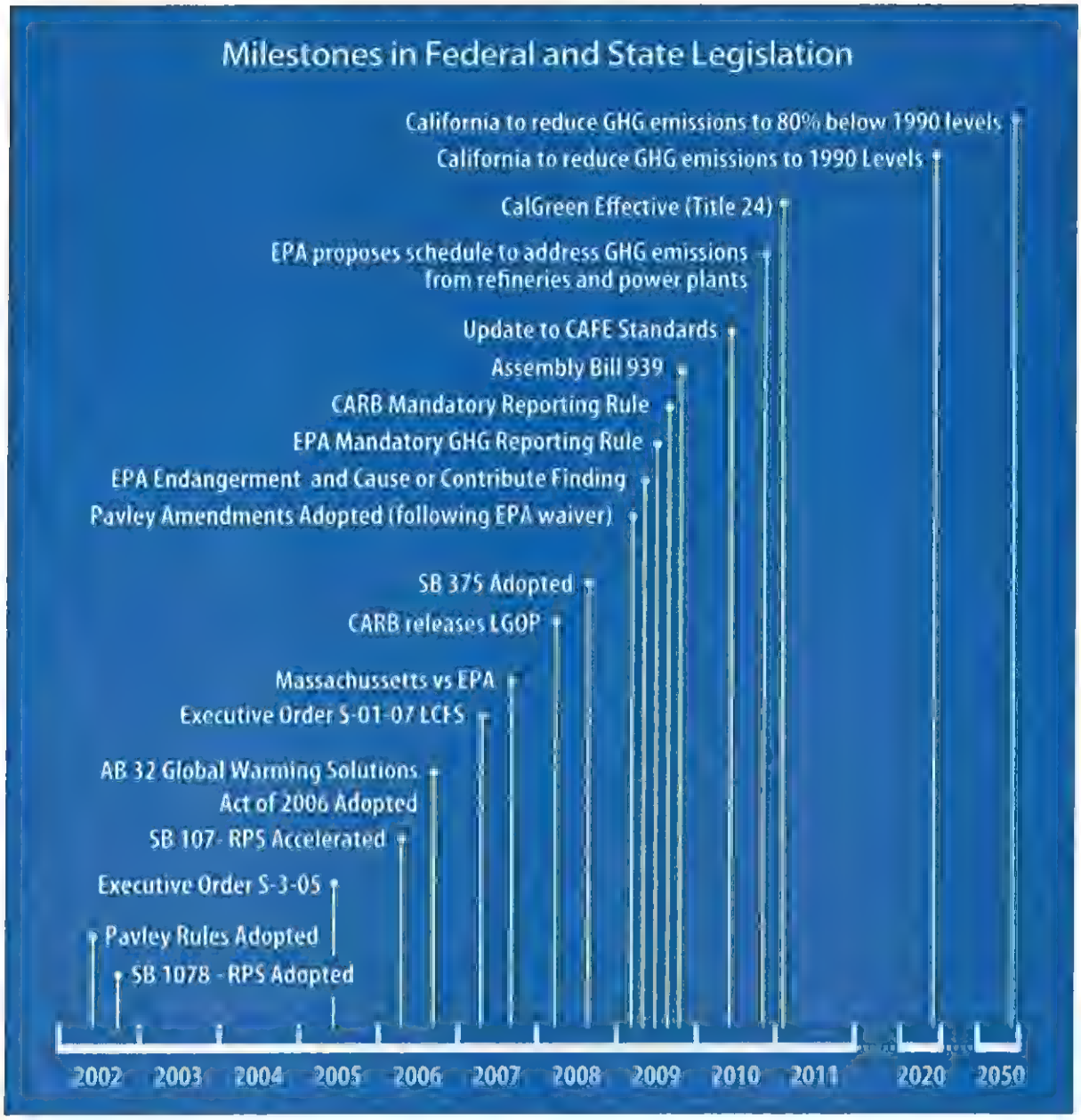
Legislation	Description
Federal	
Massachusetts et al. v. U.S. Environmental Protection Agency (2007)	Twelve U.S. states and cities including California, in conjunction with several environmental organizations, sued to force EPA to regulate GHGs as a pollutant pursuant to the Clean Air Act (CAA) in *Massachusetts et al. v. Environmental Protection Agency* (549 US 497) (2007). The court ruled that the plaintiffs had standing to sue, GHGs fit within the CAA's definition of a pollutant, and the EPA's reasons for not regulating GHGs were insufficiently grounded in the CAA.
U.S. Environmental Protection Agency Endangerment Finding (2009)	In its "Endangerment Finding," the Administrator of the EPA found that GHGs, as described above, threaten the public health and welfare of current and future generations. The Administrator also found that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare. Although the Finding of Endangerment does not place requirements on industry, it is an important step in EPA's process to develop regulation. This measure was a prerequisite to finalizing EPA's proposed GHG emission standards for light-duty vehicles (U.S. Environmental Protection Agency 2010).
U.S. Environmental Protection Agency Cause or Contribute Finding (2010)	In its "Cause or Contribute Finding" the EPA Administrator found that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution that threatens public health and welfare (U.S. Environmental Protection Agency 2010).
U.S. Environmental Protection Agency Mandatory Reporting Rule for GHGs (2009)	Under the rule, suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit 25,000 MT or more per year of GHGs are required to report annual emissions to the EPA. The first annual reports for the largest emitting facilities, covering calendar year 2010, were submitted to the EPA in 2011. The mandatory reporting rule does not limit GHG emissions but establishes a standard framework for emissions reporting and tracking of large emitters (U.S. Environmental Protection Agency 2010).
U.S. Environmental Protection Agency regulation of Stationary Sources under the Clean Air Act	Pursuant to its authority under the Clean Air Act, the EPA has been developing regulations for new stationary sources such as power plants, refineries, and other large sources of emissions. Pursuant to the President's 2013 Climate Action Plan, the EPA has also been directed to also develop regulations for existing stationary sources.

Legislation	Description
Update to Corporate Average Fuel Economy Standards (2009)	The new Corporate Average Fuel Economy (CAFE) standards incorporate stricter fuel economy standards promulgated by the State of California into one uniform standard. Additionally, automakers are required to cut GHG emissions in new vehicles by roughly 25% by 2016. EPA, National Highway Traffic Safety Administration (NHTSA), and ARB have established GHG emissions standards for 2017 to 2025 model year passenger vehicles, which require an industry-wide average of 54.5 miles per gallon in 2025 (U.S. Environmental Protection Agency et al. 2011a). The rule was finalized by the NHTSA in 2012 (National Highway Traffic Safety Administration 2012).
State	
Executive Order S-03-05 (2005)	Executive Order (EO) S-03-05 established the following GHG emission reduction targets for California's state agencies. • By 2010, reduce GHG emissions to 2000 levels. • By 2020, reduce GHG emissions to 1990 levels. • By 2050, reduce GHG emissions to 80% below 1990 levels. Executive orders are binding only on state agencies. Accordingly, EO S-03-05 will guide state agencies' efforts to control and regulate GHG emissions but will have no direct binding effect on local efforts. The Secretary of Cal-EPA is required to report to the Governor and state legislature biannually on the impacts of global warming on California, mitigation and adaptation plans, and progress made toward reducing GHG emissions to meet the targets established in this executive order.
Assembly Bill 1493 – Pavley Rules (2002, amendments 2009)	Known as "Pavley I," AB 1493 standards were the nation's first GHG standards for automobiles. AB 1493 requires ARB to adopt vehicle standards that will lower GHG emissions from new light-duty automobiles to the maximum extent feasible beginning in 2009. Additional strengthening of the Pavley standards (Pavley II/Advanced Clean Cars) has been proposed for vehicle model years 2017–2025. Together, the two standards are expected to increase average fuel economy to roughly 43 miles per gallon (mpg) by 2020 and reduce GHG emissions from the transportation sector in California by approximately 14%. The new federal CAFE standards, described above, are the analogous national policy. EPA and ARB have adopted a joint rulemaking to establish GHG emissions standards for 2017 to 2025 model-year passenger vehicles. The Interim Joint Technical Assessment Report for the standards evaluated four potential future standards ranging from 47 to 62 miles per gallon in 2025. The standards were approved by ARB and NHTSA in 2012 (California Air Resources Board 2012, National Highway Traffic Safety Administration 2012).

Legislation	Description
Senate Bills 1078 (2002), 107 (2006) and X1-2 (2011) and Executive Order S-21-09 - Renewable Portfolio Standard	Senate Bills (SBs) 1078, 107, California's Renewable Portfolio Standard (RPS), obligates investor-owned utilities (IOUs), energy service providers (ESPs), and Community Choice Aggregations (CCAs) to procure an additional 1% of retail sales per year from eligible renewable sources until 20% is reached, no later than 2010. Senate Bill 2 (2011) set forth a longer range target of procuring 33% of retail sales by 2020. Executive Order S-21-09, signed by California's Governor in September 2009, requires the ARB to adopt a renewable energy program requiring 33% renewable energy by 2020.
Assembly Bill 32 – California Global Warming Solutions Act (2006)	AB 32 codified the State's GHG emissions target by requiring that the state's global warming emissions be reduced to 1990 levels by 2020. Since being adopted, the ARB, CEC, the California Public Utilities Commission (CPUC), and Building Standards Commission have been developing regulations that will help meet the goals of AB 32 and EO S-03-05. The Scoping Plan for AB 32 identifies specific measures to reduce GHG emissions to 1990 levels by 2020, and requires ARB and other state agencies to develop and enforce regulations and other initiatives for reducing GHGs. On February 10, 2014, the ARB released the Draft Proposed First Update to the Scoping Plan. This update builds upon the initial Scoping Plan. It identifies new funding sources, defines ARB's climate change priorities for the next five years, highlights California's progress toward the 2020 goal, and sets the groundwork to reach longer-term goals beyond 2020.
Executive Order S-01-07 – Low Carbon Fuel Standard (2007)	EO S-01-07 mandates: (1) that a statewide goal be established to reduce the carbon intensity of California's transportation fuels by at least 10% by 2020, and (2) that a Low Carbon Fuel Standard (LCFS) for transportation fuels be established in California.
Assembly Bill 939, title 27 (2009) – Landfill Methane Regulation	In 2009 ARB approved regulations for methane emissions from municipal solid waste landfills. This regulation will reduce methane emissions from landfills primarily by requiring owners and operators of certain uncontrolled landfills to install gas collection and control systems, and by requiring existing and newly installed gas collection and control systems to operate optimally.

Legislation	Description
Senate Bill 375 – Sustainable Communities Strategy (2008)	SB 375 provides for a new planning process that coordinates land use planning, regional transportation plans, and funding priorities in order to help California meet the GHG reduction goals established in AB 32. SB 375 requires regional transportation plans, developed by metropolitan planning organizations (MPOs) to incorporate a "sustainable communities strategy" (SCS) in their Regional Transportation Plans (RTPs). The goal of the SCS is to reduce regional vehicle miles traveled (VMT) through land use planning and consequent transportation patterns. ARB set regional GHG reduction targets that will focus each SCS. SB 375 also includes provisions for streamlined CEQA review for some infill projects such as transit-oriented development. The SCS for the Southern California region was adopted by the Southern California Associated governments (SCAG) in 2012.
ARB GHG Mandatory Reporting Rule Title 17 – 2009	In December 2007, ARB approved a rule requiring mandatory reporting of GHG emissions from certain sources, pursuant to AB 32. Facilities subject to the mandatory reporting rule must report their emissions from the calendar year 2009 and have those emissions verified by a third party in 2010. In general, the rule applies to facilities emitting more than 25,000 MT CO_2e in any given calendar year or electricity-generating facilities with a nameplate generating capacity greater than 1 megawatt (MW) and/or emitting more than 2,500 MT CO_2e per year. Additional requirements also apply to cement plants and entities that buy and sell electricity in the state.
Senate Bill X7 – The Water Conservation Act of 2009 (2009)	SB X7 was enacted in November 2009 and requires urban water agencies throughout California to increase conservation to achieve a statewide goal of a 20% reduction in urban per capita use (compared to nominal 2005 levels) by December 31, 2020 (referred to as the "20X2020 goal"). Each urban water retailer in the county subject to the law has established a 2020 per-capita urban water use target to meet this goal.

Figure 1-2. Key Milestones in Federal and State Climate Legislation



1.2.2 Local Governments

The AB 32 Scoping Plan lays out California's plan for achieving the GHG reductions required by AB 32. Specifically, the Scoping Plan describes a list of measures that the state will undertake, and the expected GHG reductions associated with these measures that will be realized before 2020. Because the state does not have jurisdictional control over many of the activities that produce GHG emissions in California, the AB 32 Scoping Plan articulates a unique role for local governments in achieving the state's GHG reduction goals. The AB 32 Scoping Plan recommends that local governments reduce

GHG emissions from both their municipal operations and the community at large to a level that is 15% below current levels. The 15% recommendation was based on CARB's estimate of 2005–2008 emissions at the time of the scoping plan because at that time CARB had not yet completed actual inventories for those years. In subsequent years, CARB completed the inventories for the 2005–2011 years. In order to meet the AB 32 target of 1990 levels, the state would have to reduce its emissions by 10 to 11% below 2005–2008 levels. Based on the latest GHG inventories for 2009-2011, the state would have to reduce its emissions by 3 to 5% below 2009–2011 levels. The reason for the decline in the percent reduction in recent years is because statewide emissions dropped significantly in 2009 (largely due to the economic recession). The scoping plan update recommends that local governments should chart a reduction trajectory that is consistent with, or exceeds, the trajectory created by statewide goals.

The AB 32 scoping plan is a roadmap for achieving AB 32 goals. Reducing statewide emissions to 1990 levels by 2020 is equivalent to cutting annual per capita emissions by 4 tons per person. The AB 32 Scoping Plan identifies the following eight key sectors for meeting this challenge.

- **Cap-and-Trade:** Limit GHG emissions from certain sectors.
- **Electricity and Energy:** Improve energy efficiency and use of renewable power.
- **High Global Warming Potential GHGs:** Enhance capture technology and reduce refrigerant use.
- **Agriculture:** Increase equipment efficiency and enhance methane capture at dairies.
- **Transportation:** Improve engine efficiency, reduce carbon content of fuels, and improve the transportation network.
- **Industry:** Target the largest emitters through audits and restrictions.
- **Forestry:** Provide sequestration credits.
- **Waste and Recycling:** Reduce waste and increase recycling.

Together, strategies outlined in the AB 32 Scoping Plan will help transform California's economy into one that is more sustainable and less reliant on fossil fuels (California Air Resources Board 2010c).

In response to the directive of the AB 32 Scoping Plan, many jurisdictions across California have completed a GHG Inventory and Reduction Plan, commonly called a Climate Action Plan (CAP). These plans generally address two types of emissions.

- The community inventory and reduction plan, or Community CAP—emissions that arise from the community at large (residents, businesses, and their associated activities within the jurisdictional boundary).
- The municipal inventory and reduction plan, or Municipal CAP—emissions that arise from the City/City's operations only (City/City buildings, vehicle fleet, activities required to provide services to the jurisdiction).

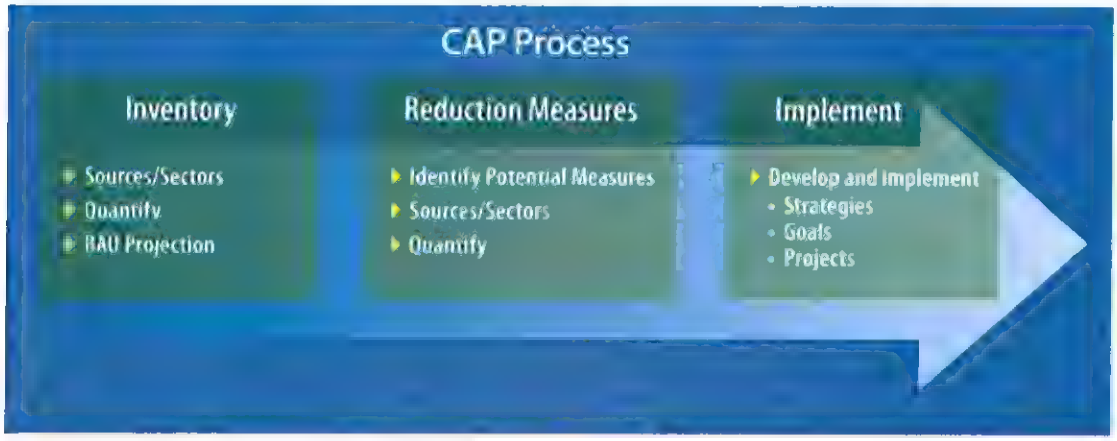
This plan is a Community CAP. It presents an inventory of GHG emissions from the City's community at large and details a strategy to reduce those emissions before 2020. More than 50 jurisdictions in Southern California have completed a CAP, a Community CAP, or both, including the City and County of San Bernardino and the cities of Los Angeles, Anaheim, Beverly Hills, Pasadena and many others.

1.3 Community Climate Action Planning Overview

The Community CAP planning process includes the following three main steps (Figure 1-3).

1. **Inventory Current and Project Future GHG Emissions.** The first step in developing a GHG reduction plan is to establish the amount of GHGs currently being emitted on a yearly basis within the boundary of interest (i.e., by all community activities within the City limits). Because GHG planning in California is driven by the state's 2020 goal, GHG inventories include not only an inventory of all GHG emissions in the baseline (current) year, but also a projection of what GHG emissions will likely be in 2020 when accounting for growth (i.e., the increased level of service and number of employees).
2. **Select and Quantify GHG Reduction Measures.** The second step is to identify measures that can be taken to reduce GHG emissions. Once selected, the amount of GHG emissions that will be avoided in 2020 (if the measures are implemented) are calculated. The final list of GHG reduction measures, when fully implemented, would result in a reduction of GHG emissions that meet AB 32 requirements.
3. **Implement GHG Reduction Measures.** The final step is to implement GHG reduction measures identified in Step 2 above. Reduction measures usually take the form of policies or programs that the City can implement and are usually tailored to complement existing programs. Implementation includes identification of responsible parties for each measure, identification of funding sources, scheduling and ongoing monitoring, and progress reporting.

Figure 1-3. The CAP Planning Process



Community Climate Action Plan

Chapter 2: Greenhouse Gas Emissions Inventory and Reduction Plan

Chapter 2
Greenhouse Gas Emissions Inventory and Reduction Plan

2.1 Emissions Inventory and Forecast

Beginning in 2011, the City conducted a detailed inventory of all GHG emissions for calendar year 2008, associated with community activities. The inventory was organized by these sectors.

- Building Energy (residential and commercial electricity and natural gas)
- On-Road Transportation (light-medium duty and heavy-duty vehicles)
- Off-Road Equipment
- Agriculture
- Solid Waste Management
- Wastewater Treatment
- Water Transport, Distribution, and Treatment
- SF_6 from Electricity Consumption

The following sectors were quantified and listed for informational purposes, but were excluded from the CAP inventory.

- Stationary Sources
- Airport-related traffic

Stationary sources were excluded to avoid duplication of state and federal regulatory efforts, such as the California Cap and Trade system, which will particularly affect large stationary sources. The stationary sources excluded from the inventory include fuel combustion other than natural gas for sources such as oil and gas production, manufacturing and industry, and food and agricultural processing. The vast majority of stationary source emissions in Ontario are from large industrial, commercial, and agricultural fuel combustion (please refer to Appendix A for a complete description of stationary sources including emissions broken down by major source category). These sources are generally subject to the California Cap and Trade regulations, and were therefore excluded from the CAP inventory to avoid duplication of state efforts to reduce these emissions. Airport-related traffic was excluded because the City has little or no influence over airport operations and passenger traffic patterns. Direct emissions associated with natural gas and indirect emissions related to electricity generation are included in the City inventory under the building energy sector.

The City also completed a projection of expected GHG emissions in 2020 accounting for a growing city population. The City is anticipated to grow from 2008 to 2020, increasing housing by 37% and total jobs by 32% (Minjares pers. comm.). Community activities will increase as the population in the City grows. GHG emissions from vehicle use, building energy use, and wastewater treatment will

therefore increase by 2020 as the City's population grows. For a detailed description of the city's 2008 GHG inventory and 2020 forecast, see Appendix A[5].

2.1.1 City of Ontario GHG Emissions in 2008

In 2008, community activities in the City resulted in the release of approximately 2.5 million MT CO_2e—roughly equivalent to the amount of GHGs released by the consumption of more than 280 million gallons of gasoline. GHG emissions in 2008 and projected emissions in 2020 are shown in Table 2-1 and Figure 2-1. As indicated, the largest source of community emissions for the City was on-road transportation, which represented 38% of total community emissions for 2008. Transportation emissions are often one of the largest sources of emissions in community inventories, and Ontario is no exception. The second largest source of emissions was from building energy use, which accounted for 37% of total community emissions for 2008. This sector includes emissions associated with natural gas combustion and electricity consumption in residential, commercial, and industrial buildings in Ontario. The third largest source was agriculture, with a contribution of 14% of the total 2008 emissions. The remaining sources in order of greatest contributions were off-road equipment (7%), solid waste management (2%), water transport, distribution, and treatment (1%), wastewater treatment (0.3%), and SF_6 from electricity consumption (0.2%). Table 2-1 and Figure 2-1 present all GHG emissions for the City for 2008.

2.1.2 City of Ontario Projected GHG Emissions in 2020

In 2020, community activities are projected to result in the release of 3.1 million MT CO_2e—an increase of approximately 25% over 2008 levels. The increase from 2008 to 2020 will occur primarily because of an increase in VMT and building energy use. As the population and employment in Ontario grow, transportation activity and energy consumption will increase. Emissions from all other sectors will increase under the BAU scenario by 2020 because of growth in the City across all economic sectors. The 2020 GHG emissions projection represents the BAU scenario, which assumes that the City and its residents and businesses will continue to utilize the same types of energy at the same rate as they do now. The BAU forecast also assumes that the United States, the state, or the City will take no action to curb emissions.

Building energy use (40%), on-road transportation (39%), and agriculture (10%) are still expected to be the largest sources of emissions in 2020. The only sector of the inventory for which emissions will not increase from 2008 to 2020 is agriculture (which will decrease by 9% due to decreased availability of agricultural land). GHG emissions from individual sectors are discussed in more detail, together with the measures that the City will take to curb them in Chapter 3, *Individual Sector Summaries*.

[5] The percentages in Appendix A do not match precisely the percentages listed in Table 2-1 because stationary sources and airport emissions are not included in Table 2-1 but are included in Appendix A.

Table 2-1. City of Ontario Community GHG Inventories: 2008 Baseline and 2020 BAU Forecast (MT CO_2e)[a]

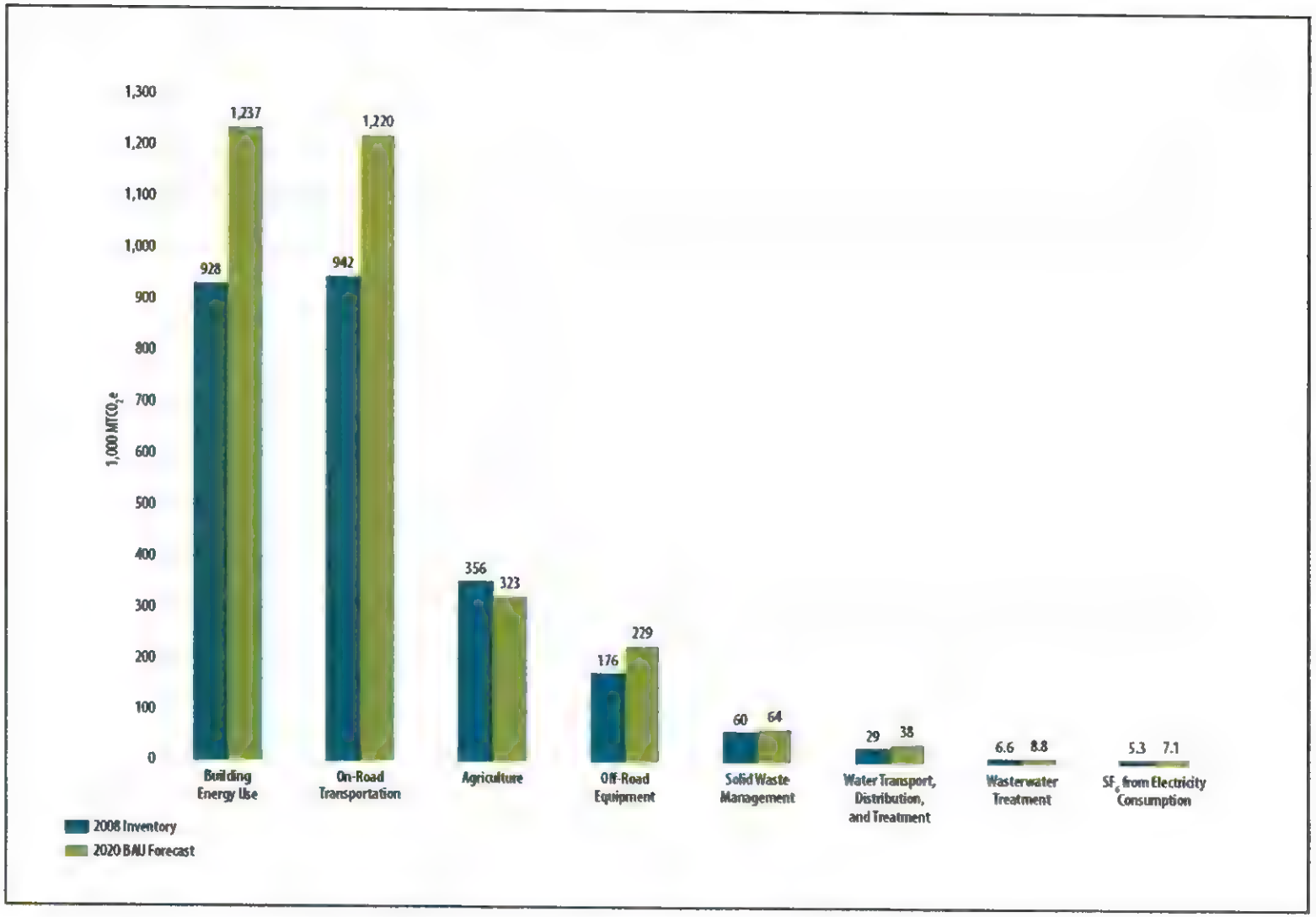
	2008		2020	
Emissions Sector	**MT CO_2**	**% of Total**	**MT CO_2**	**% of Total**
Building Energy Use	928,409	37%	1,237,006	40%
On-Road Transportation	942,020	38%	1,219,767	39%
Off-Road Equipment	176,314	7%	229,069	7%
Agriculture	356,131	14%	323,390	10%
Solid Waste Management	60,000	2%	64,326	2%
Wastewater Treatment	6,587	0.3%	8,781	0.3%
Water Transport, Distribution, and Treatment	29,044	1%	38,575	1%
SF_6 from Electricity Consumption	5,310	0.2%	7,072	0.2%
Total Emissions	**2,503,816**	**100%**	**3,127,987**	**100%**
Excluded Emissions[b]				
Stationary Sources	405,195	N/A	511,548	N/A
Airport-Related Traffic	28,736	N/A	75,976	N/A
Subtotal Excluded Emissions	**433,932**	**N/A**	**587,525**	**N/A**

Values may not sum due to rounding. For a detailed description of the city's 2008 GHG inventory and 2020 forecast, see Appendix A

[a] The calculations presented above contain a certain amount of uncertainty. Quantitative error analyses are complicated, require detailed statistical equations, and are outside the scope of the consultant's work. The EPA estimates an error range of -1 to 6% for the 2009 national inventory. Given that the City's 2008 inventory employed similar methods and analysis factors, a similar level of error can be expected, yielding an emissions range of 2,507,227 MT CO_2e to 2,380,599 MT CO_2e. The uncertainty associated with the 2020 forecast is likely higher due to the assumptions associated with future socioeconomic data.

[b] As stated above, the City elected not to include these emissions in its CAP inventory. Amounts are provided for informational purposes only, and were not used to develop the CAP reduction goal.

Figure 2-1. 2008 GHG Emissions and Projected Emissions in 2020 by Sector



2.2 City of Ontario's Emissions Reduction Target

The City's GHG emissions in 2008 were approximately 2.5 million MT CO_2e. Reducing emissions to 30% below 2020 levels would result in emissions of approximately 2.2 million MT CO_2e in 2020. In 2020, the City's GHG emissions are projected to be approximately 3.1 million MT CO_2e in the absence of any measures by either the State of California or the City. The reductions needed to reach the target are approximately 940,000 MT CO_2e (Table 2-2).

Table 2-2. How is the City of Ontario's GHG Reduction Target Calculated?

GHG Emissions		MT CO_2e
A	Projected in 2020 (based on projected growth from 2008 baseline)	3,127,987
B	Target for 2020—30% below 2020 levels	2,189,591
	Total Reductions Needed to Reach Target (A minus B)	**938,369**

To achieve the desired emissions reduction target, the City has selected 44 local mitigation measures in addition to those that will be implemented at the state level. Of the 44 measures, 21 have been quantified for GHG reductions. The remaining measures were not quantified due to insufficient data needed to quantify reductions. These measures were chosen based on the pattern of existing and future emissions sources, the suite of ongoing City efficiency and environmental programs, and areas where opportunities for significant GHG reductions overlapped favorably with the City jurisdictional control and financial concerns. Chapter 3, *Individual Sector Summaries*, discusses the individual measures by sector.

2.3 Reduction Measure Selection Process

The City reviewed a comprehensive list of potential measures, or candidate measures that could be taken to reduce GHG emissions from the City's community activities. This initial list drew from federal and state resources, recommendations from the attorney general, CAPs throughout California, and the City's current and proposed efficiency and environmental programs. From this initial list, the City identified measures or groups of measures as being feasible to pursue in order to reduce GHG emissions by 2020. These measures were then compared and tailored to be consistent with existing and planned City departmental programs. The City already had in place or was planning to initiate many programs that, although designed for a different purpose, would result in significant energy and GHG savings for the City in 2020. Examples of these programs include workforce development, water supply and demand management, and grants for waste reduction. Existing programs that already influenced activity and emissions in the community in 2008 were not counted toward the CAP reductions. Because these programs already influenced activity in 2008, such as by reducing energy use, water use, and waste generation, the 2008 activity data used to prepare the GHG inventory already accounted for any reductions achieved by 2008. Also, because the forecast uses the same carbon intensity values as the 2008 inventory without the influence of any additional state or local measures past 2008, the impact of existing local measures past 2008 were not counted in the BAU forecast. Reductions in the CAP for existing programs are only

associated with actions occurring from 2008 to2020, and these actions are not already counted in the BAU forecast as discussed above.

Finally, the GHG reductions associated with all of the selected measures were quantified in addition to GHG reductions expected from state-level programs whose actions will be implemented regardless of local action taken by the City. For a detailed description of the City's GHG reduction measures, including quantification methods, sources and assumptions, see Appendix C.

2.4 City of Ontario's Reduction Plan

The measures described in this Community CAP would, if fully implemented, result in 2020 emissions approximately 30.1% below 2020 levels, or approximately 2.2 million MT CO_2e, as shown in Table 2-3.

Table 2-3. Reaching the Target—Sector View

GHG Emissions		**(MT CO_2e)**
A	Projected in 2020 (BAU)	3,127,987
B	Target for 2020—30% below 2020 levels	2,189,591
	Reductions Needed to Reach Target (A minus B)	**938,369**
City Emissions Reductions By Sector		
	Building and Renewable Energy[a]	393,300
	On-Road Transportation[b]	365,212
	Off-Road Equipment[b]	28,166
	Solid Waste Management[c]	26,265
	Wastewater Treatment[d]	649
	Water Transport, Distribution, and Treatment[e]	6,511
	Agriculture	80,352
	SF_6 from Electricity Consumption[f]	1,678
	Performance Standard for New Development[g]	39,769
Total Reductions		**941,902**
	Exceeds Reduction Target by	**3,506**
	GHG Emissions in 2020 with Community CAP (all measures)	**2,186,084**
	% Below Projected Levels	**30.1%**

For a detailed description of the City's GHG reduction measures, including quantification methods, sources and assumptions, see Appendix C.

[a] Includes GHG benefits from the Renewables Portfolio Standard (state), energy conservation measures, increased use of renewable power sources, shade tree planting, and reductions in building energy use related to wastewater treatment measures (increased wastewater treatment operational efficiency) and water conservation measures. When water consumption in buildings is reduced, and much of that water would have been heated (dishwashing, clothes washing, sinks, showers, etc.) using natural gas or electric heaters, building energy use is reduced at the same time.

[b] Includes GHG benefits from the Low Carbon Fuel Standard.

[c] Includes GHG benefits from San Bernardino County Landfill Methane Capture Systems (County-1).

[d] Includes reductions in wastewater treatment fugitive emissions only.

[e] Includes GHG benefits from embedded energy savings from water transport, distribution, and treatment.

[f] Includes reductions in SF_6 due to any measure which reduces grid electricity.

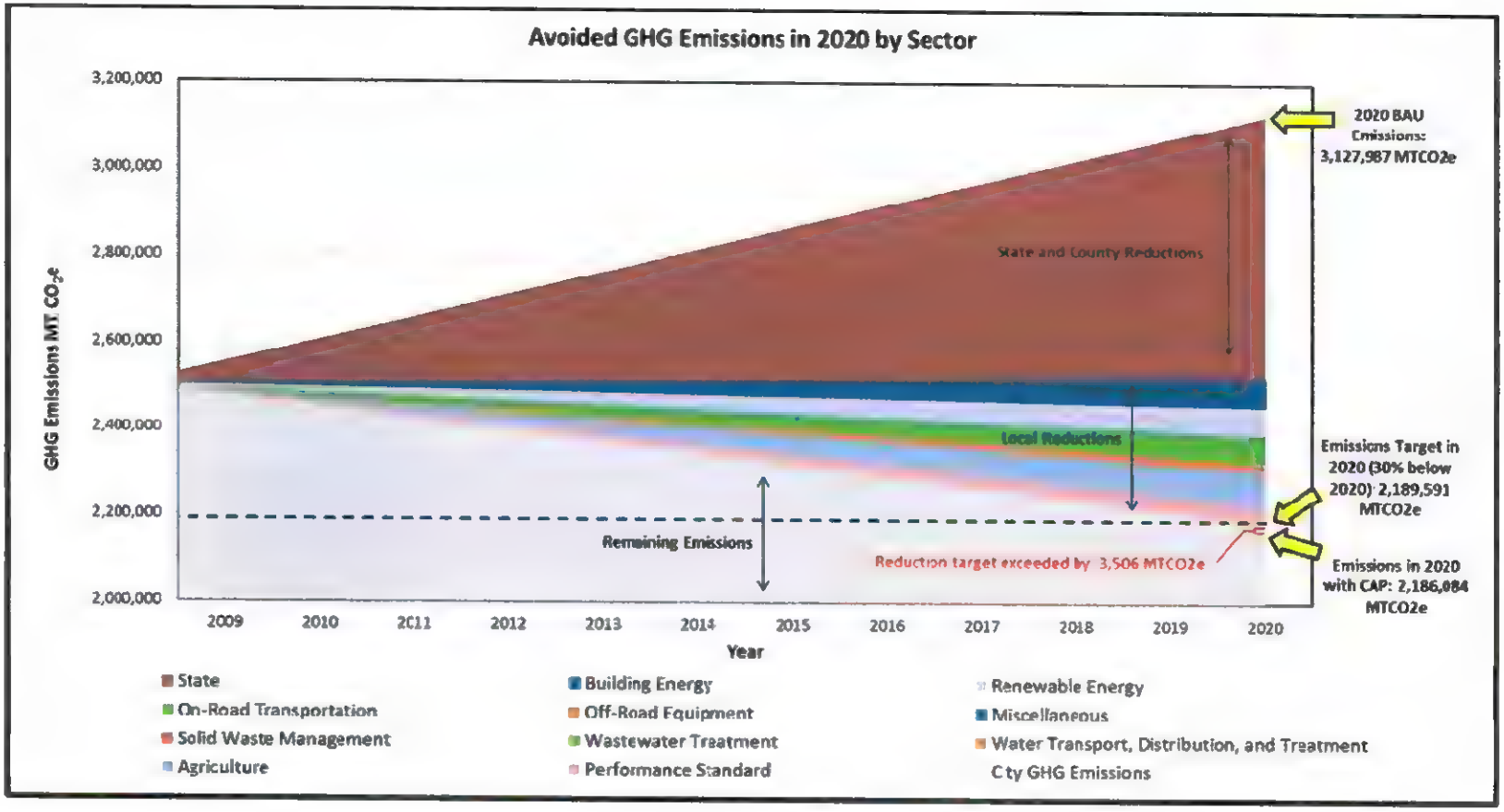
[g] Not a sector of the inventory.

Table 2-3 and Figure 2-2 show that the largest percentage of GHG reductions in the City's plan comes from reductions in building energy use and increased use of renewable energy (42% or approximately 393,000 MT CO_2e), reductions in emissions associated with transportation (39% or 365,000 MT CO_2e), and reductions in emissions associated with agriculture (9% or 80,000 MT CO_2e). Off-road equipment, solid waste management, wastewater treatment, water, and performance standard measures also contribute to overall GHG reductions achieved through City measures. Chapter 3, *Individual Sector Summaries*, provides a detailed description of avoided GHG emissions in each sector.

2.5 Other Measures to Reduce GHGs

The City's Community CAP includes many measures that do not have an associated absolute number of MT CO_2e; therefore, MT CO_2e could not be quantified and counted toward the reduction goal. However, these measures likely result in GHG savings and are listed as Non-Quantifiable (NQ) in the sector summaries in Chapter 3. Many of these measures have already been implemented or are currently planned to be implemented, and are considered best management practices (BMPs) for a particular sector. Data necessary to estimate the GHG emissions avoided by these practices or analytical methods to estimate the avoided GHG emissions are currently unknown.

Figure 2-2. Reaching the Target: Sector View



CITY OF ONTARIO

Community Climate Action Plan

Chapter 3: Individual Sector Summaries

Chapter 3
Individual Sector Summaries

The City's Community CAP sets forth a framework for reducing 2020 community emissions that is consistent with AB 32. Successful implementation of the Community CAP would require commitment and action throughout the City's buildings and operations. Based on the City's GHG emissions inventory, the CAP targets the following eleven sectors.


Performance Standard for New Development

Building Energy


Renewable Energy


Wastewater Treatment


Solid Waste Management


On-Road Transportation


Off-Road Equipment


Agriculture


Water Transport, Distribution, and Treatment


SF_6 from Electricity Consumption


Miscellaneous

Not all of these are specific sectors of the inventory, but are rather refined CAP measures organized to more logically categorize the measures. For example, renewable energy is not a sector of the inventory; renewable energy measures were separated from building energy measures to show a distinction between these two types of measures. Both building energy measures and renewable energy measures reduce emissions in the building energy sector.

The following sector discussions describe how implementation of the Community CAP results in avoided GHG emissions. A detailed table provides a listing of sector measures and categorizes them as state measures (e.g. State-1), municipal measures (e.g. Muni-1)[6], and local sector-specific measures (e.g. Energy-1). Each table also includes brief measure descriptions and associated emissions reductions that will be achieved by 2020. Those measures that could not be quantified due to unavailable data, overlap with other measures, or have already been implemented are identified as non-quantifiable (NQ); however, they are supportive measures.

[6] Municipal measures were developed in the City of Ontario Municipal Climate Action Plan. Some of these measures will not overlap with community measures, and were included in the CCAP because they contribute additional GHG reductions beyond community measures.

3.1 Performance Standard for New Development

New development in the City has the potential to be an important contributor to the City's GHG emissions reductions efforts. Through ensuring quantification of GHG emissions associated with new projects and the development of reduction measures to reduce these emissions, the Performance Standard for New Development would result in reductions in GHG emissions in 2020 of approximately 40,000 MT CO_2e (Table 3-1).

Table 3-1. GHG Reduction Measures from the Performance Standard for New Development

GHG Reduction Measures		Simple Definition	GHG Reductions Achieved by 2020 (MT CO_2e)
PS-1	**Performance Standard for New Development**: The City's Performance Standard for New Development (PS) would provide a streamlined and flexible program for new residential and nonresidential projects to reduce their emissions. The PS would include performance standards for new private developments as part of the discretionary approval process under CEQA. Under the PS new projects would be required to quantify project-generated GHG emissions and adopt feasible reduction measures to reduce project emissions to 25% below 2020 BAU project emissions. The PS does not require that project applicants implement a predetermined set of measures. Rather, project applicants are encouraged to choose the most appropriate measures for achieving the percent reduction goal, while taking into consideration cost, environmental or economic benefits, schedule, and other project requirements. The PS applies to all projects emitting more than 3,000 MT CO_2e per year, which is roughly equivalent to 90% of projects. Projects emitting less than this amount must implement a suite of BMPs. Refer to Appendix C for more information.	New projects emitting more than 3,000 MT CO_2e per year need to reduce emissions by 25%.	39,295
BMP-1	**Performance Standard for Smaller New Development Projects: Best Management Practices. Exceed Title 24 Energy-Efficiency Standards for New Buildings by 5% by 2020**: All new residential and nonresidential buildings emitting less than 3,000 MT CO_2e per year, which is roughly equivalent to 10% of projects, must exceed the Energy Efficiency Standards under Title 24 by at least 5%, or equivalent level of GHG emission reduction	New projects emitting less than 3,000 MT CO_2e per year to exceed Title 24 Energy Efficiency Standards by 5%, or equivalent level of GHG emission reduction	474
Total GHG Reductions for the Performance Standard in 2020			**39,769**

3.2 Building Energy

The City is committed to reducing the GHG emissions associated with residential and nonresidential buildings through retrofits, planting shade trees to reduce building electricity use, and implementing water conservation measures to reduce the need for energy to heat water inside homes and businesses. Table 3-2 lists all building energy measures and identifies them as state measures, municipal measures, or local community measures. Because the Building Energy (BE) sector represented a significant percentage (37%) of total emissions in 2008 and projected emissions for 2020, the potential for GHG benefits in this sector is large. The GHG savings in the building energy sector is approximately 191,000 MT CO_2e.

Table 3-2. GHG Reduction Measures in the Building Energy Sector

GHG Reduction Measures		Simple Definition	GHG Reductions Achieved by 2020 (MT CO_2e)
State-1	**Title 24 Standards for Residential and Non-Residential Buildings (CALGreen):** Requires that building shells and building components be designed to conserve energy and water. Mandatory and voluntary measures became effective on January 1, 2011, and the guidelines will be periodically updated.	N/A	80,199
State-2	**AB 1109 (Huffman) Lighting Efficiency and Toxics Reduction Act:** Structured to reduce statewide electricity consumption in the following ways: (1) at least 50% reduction from 2007 levels for indoor residential lighting, and (2) at least 25% reduction from 2007 levels for indoor commercial and outdoor lighting, by 2018.	N/A	31,942
State-3	**AB 1470 (Huffman):** This measure would reduce natural gas use for residential and non-residential water heating by installing 200,000 solar water heaters by 2020 (measure was quantified for residential only).	N/A	506
State-4	**Industrial Boiler Efficiency:** This measure, evaluated by ARB, would require one or more of the following: annual tuning of all boilers, the installation of an oxygen trim system, and/or a non-condensing economizer to maximize boiler efficiency. A source could also replace an existing boiler with a new one that is equipped with these systems. This measure, although not part of the recommendation in the AB 32 GHG emissions reduction program, was used as a surrogate for the cap-and-trade program in the economic modeling.	N/A	10,806
Muni-1	**Municipal Energy Measures**: Implement measures that contribute toward community	N/A	1,861

GHG Reduction Measures		Simple Definition	GHG Reductions Achieved by 2020 (MT CO_2e)
	reductions and do not overlap with other community measures. The MCAP measures include *PM Energy-1* through *PM Energy-11*, *PM ST-1*, and *Water and Sewage-1*.[a]		
Energy-1	**CAP Consistency**: Ensure that the City's local Climate Action, Land Use, Housing, and Transportation Plans are aligned with, support, and enhance any regional plans that have been developed consistent with state guidance to achieve reductions in GHG emissions.	N/A	NQ
Energy-2	**Regional Cooperation**: Coordinate with special districts, nonprofits, and other public organizations to share resources, achieve economies of scale, and develop green building policies and programs that are optimized on a regional scale.	N/A	NQ
Energy-3	**Energy Efficiency Funding for Existing Low-Income Residents**: Partner with community services agencies to fund energy efficiency projects, including heating, ventilation, air conditioning, lighting, water heating equipment, insulation, and weatherization, for low income residents. Provide permitting-related and other incentives for energy efficient building project.	Retrofit 4,903 existing single-family and multi-family low income homes to save 2,632,164 kilowatt hours (kWh) and 23,216 therms (537 kWh and 5 therms per home). This represents a 27% penetration rate for low income homes.[b]	711
Energy-4	**Energy Efficiency Incentives and Programs to Promote Retrofits for Existing Residential Buildings:** Incentivize, or otherwise support, voluntary energy efficiency retrofits of existing residential buildings to achieve reductions in natural gas and electricity usage. Adopt standards and/or promote voluntary programs that retrofit indoor lights, electric clothes dryers, energy-star thermostats, window seals, duct sealing, air sealing, and attic insulation.	Retrofit 7,684 single-family homes and 5,322 multi-family homes: [b] 1) all homes replace incandescent lights with Compact Fluorescent Light bulbs (CFLs) and seal air leaks; 2) 2,305 single-family homes and 1,597 multi-family homes also install programmable thermostats and double-paned windows; 3) 1,537 single-family homes and 1,064 multi-family homes also insulate their attics, install natural gas clothes dryers, and install ENERGY STAR furnaces.	14,408
Energy-5	**Energy Efficiency Incentives and Programs to Promote Retrofits for Existing Non-Residential Buildings:** Voluntary programs for existing non-residential facilities improve building-wide energy efficiency by 20% by 2020.	Retrofit 27% of existing non-residential buildings. These buildings to reduce energy use by 20% per building to save 52.7 million kWh and 3.3 million therms.	29,576
Energy-6	**Streetlights**: Adopt outdoor lighting	Reduce streetlight and traffic	3,199

GHG Reduction Measures		Simple Definition	GHG Reductions Achieved by 2020 (MT CO_2e)
	standards to reduce electricity consumption. Require 40% reduction in energy use from traffic signals and streetlights by 2020.	signal electricity use by 40% to save 14.3 million kWh.	
Misc-3 (BE)	**Shade Tree Planting**: Promote the planting of shade trees and establish shade tree guidelines and specifications.	Plant 1,000 trees per year from 2012–2020 for a total of 9,000 trees by 2020.	57
Water-1 (BE)	**Water Conservation for Existing Buildings**: Implement a program to renovate existing buildings to require a higher level of water efficiency. Require 25% of existing buildings within the community to achieve a 25% reduction in water use. This measure will reduce both indoor and outdoor water use.	15,282 existing residential units to reduce total water use (indoor + outdoor) by 25% for a total savings of 459 MG (30,000 gallons/home). 25% of existing non-residential units to reduce total water use (indoor + outdoor) by 25% for a total savings of 698 MG.	8,823
Water-4 (BE)	**SB X7**: SB X7was enacted in November 2009 and requires urban water agencies throughout California to increase water conservation to achieve a statewide goal of a 20% reduction in urban per capita use by December 31, 2020.	Reduce City-wide water use by 936 MG under the direction of the City of Ontario 2010 Urban Water Management Plan.	6,011
Wastewater-2 (BE)	**Wastewater System Efficiency**: Encourage IEUA to upgrade and replace wastewater treatment and pumping equipment with more energy efficient equipment at the IEUA Regional Water Recycling Plant No. 1 (RP-1) wastewater treatment plant by 2020. Recommend that all pumping and treatment equipment be 25% more energy efficient. Utilize BMPs for the treatment of waste.	N/A	2,832
Total GHG Reductions in Building Energy in 2020			**190,931**

Note: Measures in italics result in GHG reductions in multiple sectors. For example, Water-1 reduces the amount of water consumed in the city, which reduces emissions for conveying that water (water transport, distribution, and treatment sector), the energy needed to heat that water (building energy sector), and the energy required to treat the associated wastewater (wastewater treatment sector). The abbreviations are: (BE) = Building Energy; (WT) = Wastewater Treatment; (WC)= Water Conveyance

[a] For a complete description of the MCAP measures, please see the City of Ontario Municipal Climate Action Plan.

[b] There are a number of existing energy retrofit programs which are available in the City of Ontario, including SCE programs, CPUC programs, the Home Energy Renovation Opportunity (HERO) program, and Southern California Gas Company (SCG) programs. Since October 2013, the HERO program has approved 4,693 projects and funded 3,070 projects in the San Bernardino Associated Governments (SANBAG) region, saving 23 GWh of electricity annually. CPUC programs have saved 502 GWh of electricity and 4.3 million therms of natural gas in San Bernardino County in 2010. In 2012, total electricity savings in the SCE service area for all energy efficiency programs were 1,744 GWh, 593 GWh in the residential sector alone (California Public Utilities Commission 2014). This is nearly 2% of total residential electricity consumption in the state (California Energy Commission 2014). In 2013, total energy savings in the SCE service area were 1,145 GWh of electricity, 335 GWh in the residential sector.

3.3 Renewable Energy

The City is committed to increasing use of renewable energy through solar panel installation. The increased use of renewable energy in the City is expected to reduce emissions by approximately 202,000 MT CO_2e of GHG emissions in 2020.

Table 3-3 lists all renewable energy measures and also includes brief measure descriptions and associated emissions reductions.

Table 3-3. GHG Reduction Measures in the Renewable Energy Sector

GHG Reduction Measures		Simple Definition	GHG Reductions Achieved by 2020 (MT CO_2e)
State-5	**Statewide Renewable Portfolio Standard (RPS):** Obligates IOUs, ESPs, and CCAs to procure 20% of retail sales from eligible renewable sources by 2013, and 25% by 2016. EO S-14-08 also sets forth a longer range target of procuring 33% of retail sales by 2020 (see http://www.energy.ca.gov/portfolio/).	N/A	**138,133**
Muni-2	**Municipal Renewable Energy Measures:** Implement measures that contribute toward community reductions and do not overlap with other community measures. These MCAP measures include *PM Renewable Energy-1* through *PM Renewable Energy-3.*[a]	N/A	**406**
Renewable Energy-1	**Solar Installation for Existing Non-Residential for Major Rehabilitations or Expansions:** Install solar photovoltaic panels on nonresidential buildings greater or equal to 25,000 square feet in size requiring discretionary permits for major rehabilitations or expansions (additions of 25,000 square feet of office retail/commercial or 100,000 square feet of industrial/warehouse floor area).	Install solar panels on the roofs of 4.1 million square feet of existing commercial buildings and 1.5 million square feet of existing industrial/warehouse buildings undertaking major rehabilitations or expansions (additions of 25,000 square feet of office retail/commercial or 100,000 square feet of industrial/warehouse floor area). 24 megawatts (MW) solar total.	**7,844**
Renewable Energy-2	**Solar Installation in Existing Single Family Housing:** Install solar panels on 22% of existing single-family homes by 2020.	Install solar panels on 6,261 existing single-family residences, for a total of 32 MW of solar.	**10,736**
Renewable Energy-3	**Solar Installation in Existing Nonresidential Buildings:** Install solar panels on 32% of existing nonresidential buildings by 2020.	Install solar panels on the roofs of 12.8 million square feet of existing commercial and 8.6 million square feet of existing industrial/warehouse buildings, for a total of 137 MW of solar.	**45,251**
Total GHG Reductions in Building Energy in 2020			**202,370**

[a] For a complete description of the MCAP measures, please see the City of Ontario Municipal Climate Action Plan.

3.4 Wastewater Treatment

Energy use associated with the treatment of wastewater (WT) is a significant contributor of GHG emissions. Implementation of water conservation and wastewater recycling measures will result in a reduction of approximately 650 MT CO_2e in 2020 (Table 3-4).

Table 3-4. GHG Reduction Measures in the Wastewater Treatment Sector

GHG Reduction Measures		GHG Reductions Achieved by 2020 (MT CO_2e)
Wastewater-1	**Recycled Water:** Require 50% of all water used for non-potable sources to be recycled water by 2020. Require all new parks and schools to use 100% recycled water for non-potable outdoor uses, as feasible. Develop public educational materials that support and encourage the use of recycled water. Adopt a City Municipal facility goal of 50% use of recycled water for non-potable sources.	NQ
Wastewater-2	**Waste-to-energy/Methane Recovery**: Encourage IEUA to implement waste-to-energy projects at the IEUA RP-1 wastewater treatment plant by 2020 and to utilize collected gas to fuel onsite stationary sources.	NQ
Water-1 (WT)	**Water Conservation for Existing Buildings:** Implement a program to renovate existing buildings to require a higher level of water efficiency. Require 25% of existing buildings within the community to achieve a 25% reduction in water use. This measure will reduce both indoor and outdoor water use.	494
Water-4 (WT)	**SB X7:** SB X7was enacted in November 2009 and requires urban water agencies throughout California to increase water conservation to achieve a statewide goal of a 20% reduction in urban per capita use by December 31, 2020.	155
Total GHG Reductions in Wastewater Treatment in 2020		649

Note: Measures in italics result in GHG reductions in multiple sectors. For example, Water-1 reduces the amount of water consumed in the city, which reduces emissions for conveying that water (water transport, distribution, and treatment sector), the energy needed to heat that water (building energy sector), and the energy required to treat the associated wastewater (wastewater treatment sector). The abbreviations are: (BE)= Building Energy; (WT) = Wastewater Treatment; (WC)= Water Conveyance

3.5 Solid Waste Management

The City generates waste through daily activities and building operations. Some portion of this waste ultimately is placed in a landfill where it decays and releases methane. In 2008, GHG emissions related to waste generation were estimated at approximately 60,000 MT CO_2e. The potential to reduce GHG emissions in this sector is high, and will in large part be achieved through a methane capture system at nearby landfills. This commitment, along with several other measures, will result in a reduction of approximately 26,000 MT CO_2e in 2020 (Table 3-5).

Table 3-5. GHG Reduction Measures in the Solid Waste Management Sector

GHG Reduction Measures		GHG Reductions Achieved by 2020 (MT CO_2e)
County-1	**San Bernardino County Landfill Methane Capture Systems:** The County of San Bernardino GHG Emissions Reduction Plan[7] specifies the following landfill methane controls at County Owned and Operated landfills that accept waste from the City: 95% capture at Mid-Valley landfill, 85% capture at Milliken and Colton landfills, and 75% capture at Barstow and Landers landfills.	24,170
Waste-1	**Waste Diversion:** Exceed the waste diversion goals recommended by AB 939 and CALGreen by adopting a waste diversion goal of at least 75% of waste.	2,095
Waste-2	**Construction and Demolition Waste Recovery Ordinance:** Implement an ordinance requiring building projects to recycle or reuse at least 50% of unused or leftover building materials.	NQ
Total GHG Reductions in Solid Waste Management in 2020		26,265

3.6 On-Road Transportation

Land use decisions, transportation system management, and vehicle technologies all play important roles in GHG emissions associated with the transportation sector. Increasing fuel efficiency while also reducing the number of automobile trips necessary for local residents can provide significant reductions in GHG emissions, as can more efficient management of the City's transportation infrastructure and practices. Measures designed to address the transportation sector will result in a reduction in emissions of approximately 365,000 in MT CO_2e in 2020 (Table 3-6).

Table 3-6. GHG Reduction Measures in the On-Road Transportation Sector

GHG Reduction Measures		GHG Reductions Achieved by 2020 (MT CO_2e)
State-6	**AB 1493 Pavley I and II:** Pavley I will reduce GHG emissions from automobiles and light duty trucks by 30% from 2002 levels by the year 2016. The regulations affect 2009 models and newer. Pavley II or Advanced Clean Cars will reduce GHG emissions from 2016 through to 2025.	272,465

[7] See: http://www.sbcounty.gov/Uploads/lus/Countywide/GreenhouseGas/Full-Vol-1.pdf

	Low Carbon Fuel Standard (LCFS): This measure reduces GHG emissions by requiring a low carbon intensity of transportation fuels sold in California by at least 10% by the year 2020. The low carbon fuel standard regulation is under development, and the reduction pathways are being analyzed.	
State-7	**AB 32 Transportation Reduction Strategies**: The AB 32 Scoping Plan includes vehicle efficiency measures (in addition to Pavley and LCFS) that focus on maintenance practices. The Tire Pressure Program will increase vehicle efficiency by assuring properly inflated automobile tires to reduce rolling resistance. The Low Friction Oils Program will increase vehicle efficiency by mandating the use of engine oils that meet certain low friction specifications. The Heavy-Duty Vehicle (related to weight class of vehicle) GHG Emission Reduction Program will increase heavy-duty vehicle (long-haul trucks) efficiency by requiring installation of best available technology and/or ARB-approved technology to reduce aerodynamic drag and rolling resistance.	**25,871**
State-8	**Sustainable Communities Strategy/Regional Blueprint Planning**: Participate with Southern California Association of Governments (SCAG) in developing a Sustainable Communities Strategy to meet the VMT reduction target developed by the ARB, as required by SB 375.	**60,002**
Muni-3	**Municipal Transportation Measures**: Implement measures that contribute toward community reductions and do not overlap with other community measures. These MCAP measures include *PM Vehicle Fleet-1* through *PM Vehicle Fleet-3* and *PM Employee Commute-1.*[a]	**884**
Trans-1	**Expand Public Transportation Infrastructure**: Work with appropriate agencies to create an interconnected transportation system that allows a shift in travel from private passenger vehicles to alternative modes, including public transit, ride sharing, car-sharing, bicycling, and walking.	**NQ[a]**
Trans-2	**Transit Frequency and Speed**: To the extent feasible, support shorter transit passenger travel time through reduced headways and increased speed. Support regional transit operator to reduce average fleet travel time by 5 minutes.	**NQ[a]**
Trans-3	**"Smart Bus" Technology**: Collaborate with LA Metro, Metrolink, and Omnitrans to implement "Smart Bus" technology, Global Positioning Systems (GPS), and electronic displays at all transit stops by 2020 to provide customers with "real-time" arrival and departure time information. Recent technological innovations have coupled GPS with electronic displays at transit stops to provide "real time" data to passengers. These tracking systems not only allow riders to know exactly when the next vehicle will be arriving, but also enables the system operator to track, schedule, and repair vehicles in service. Providing better information to passengers about scheduled arrivals can result in dramatic increases in passengers' perceptions of the service, even if the actual service provided is the same in terms of frequency and on-time arrivals.	**436**
Trans-4	**Expand Public Transportation Participation**: Collaborate with regional transit operator on programs to increase use of the City's public transportation system.	**NQ[b]**
Trans-5	**Low- and Zero-Emission Vehicles**: Support and promote the use of low-and zero-emission vehicles in the City.	**NQ[b]**
Trans-6	**Vehicle Idling**: Limit idling of Heavy Duty Trucks (greater than 26,000 gross vehicle weight) to 3 minutes (California law currently limits idling time to 5 minutes). Support the South Coast Air Quality Management District (SCAMQD) and ARB anti-idling requirements and provide signage in key areas where idling that is not consistent with SCAMQD or ARB requirements might occur.	**5,555**
Trans-7	**Parking Policy**: Adopt a comprehensive parking policy that encourages carpooling and the use of alternative transportation, including providing parking spaces for car-share vehicles at convenient locations accessible by public transportation. Consider requirements for the following to reduce VMT within the City by 2%. Designate 5% of downtown parking spaces for ride-sharing vehicles.	**NQ[b]**
Trans-8	**Event Parking:** Consider establishing policies and programs to reduce onsite	**NQ[b]**

	parking demand and promote ride-sharing during events at the Ontario Convention Center and other event venues. Consider a goal to reduce VMT at major events by 2%.	
Trans-9	**Roadway Management**: Implement traffic and roadway management strategies to improve mobility and efficiency, and reduce associated emissions. Consider a goal to reduce community vehicle fuel consumption by 2%.	NQ[b]
Trans-10	**Signal Synchronization**: Evaluate potential efficiency gains from further signal synchronization. Synchronize traffic signals throughout the City and with adjoining cities while allowing free flow of mass transit systems. Require continuous maintenance of the synchronization system. Consider a goal to reduce City-wide vehicle fuel consumption by 2%.	NQ[b]
Trans-11	**School Transit Plan**: Encourage local school districts to develop school transit plans to substantially reduce automobile trips to, and congestion surrounding, schools. (According to some estimates, parents driving their children to school account for 20–25% of the morning commute.) Plans may address, e.g., necessary infrastructure improvements and potential funding sources; replacing older diesel buses with low or zero-emission vehicles; mitigation fees to expand school bus service; Safe Routes to School programs, and; other formal efforts to increase walking and biking by students. Although this measure is not within the City's authority, Ontario can work with local school districts to develop these plans.	NQ[b]
Trans-12	**Ridesharing Programs**: The City will coordinate with local agencies to promote ride sharing programs in Ontario. Although the City does not have the legal authority to impose trip demand management programs on project applicants or employers, Ontario can work with local agencies to develop these programs. Consider a goal to reduce City-wide VMT by 2% through mode-shifts from single-occupancy vehicles to carpools. Facilitate employment opportunities that minimize the need for private vehicle trips. The City could also work with the County to participate in their rideshare measure, which includes exploring financial programs for the purchase or lease of rideshare vehicles, encouraging community car sharing through city employers, and encouraging creation of community rideshare incentives (gas cards, commuter-tax benefits, guaranteed ride home programs, etc.).	NQ[b]
Trans-13	**Bicycle and Pedestrian Infrastructure Plan**: Adopt a comprehensive bicycle and pedestrian infrastructure plan to expand the City's bicycle and pedestrian network. This plan would encourage residents and employees to use bicycles and walking as a method of transportation. Consider a goal to reduce City-wide VMT by 2% through mode-shifts from single-occupancy vehicles to bicycles.	NQ[b]
Trans-14	**Development Standards for Bicycles**: Establish standards for new development and redevelopment projects to support bicycle use. Consider a goal to reduce VMT resulting from new development by 4% through mode-shifts from single-occupancy vehicles to bicycles.	NQ[b]
Trans-15	**Smart Growth and Infill**: Encourage high-density, mixed-use, infill development and creative reuse of brownfield, under-utilized and/or defunct properties within the urban core. Consider a goal to reduce VMT resulting from new development by 5%.	NQ[b]
Trans-16	**Transit-Oriented Development**: Identify transit centers appropriate for mixed-use development, and promote transit-oriented, mixed-use development within these targeted areas. Consider a goal to reduce VMT resulting from new development by 2%.	NQ[b]
Total GHG Reductions in On-Road Transportation in 2020		**365,212**

[a] For a complete description of the MCAP measures, please see the City of Ontario Municipal Climate Action Plan.

[b] These measures are likely already covered by *State-8 Sustainable Communities Strategy/Regional Blueprint Planning*. For this reason they were not quantified to avoid double-counting GHG reductions.

3.7 Off-Road Equipment

Construction and landscaping equipment produce GHG emissions, both during their use and when idling. Reducing the carbon content of the fuel, replacing conventional gasoline or diesel-fueled equipment with electric equipment, and reducing time spent idling, along with other strategies, can lead to emissions reductions. Reductions associated with the use of off-road vehicles will result in the reduction of approximately 28,000 MT CO_2e in 2020 (Table 3-7).

Table 3-7. GHG Reduction Measures in the Off-Road Equipment Sector

GHG Reduction Measures		Simple Definition	GHG Reductions Achieved by 2020 (MT CO_2e)
State-9	**Low Carbon Fuel Standard (LCFS):** This measure reduces GHG emissions by requiring a low carbon intensity of transportation fuels sold in California by at least 10% by the year 2020. The low carbon fuel standard regulation is under development, and the reduction pathways are being analyzed.	N/A	**20,465**
Muni-4	**Municipal Off Road Measures:** Implement measures that contribute toward community reductions and do not overlap with other community measures. These MCAP measures include *PM Vehicle Fleet-1* through *PM Vehicle Fleet-5*.[a]	N/A	**13**
Off Road-1	**Idling Ordinance:** Limit idling time for heavy-duty off-road construction equipment beyond ARB or local air district regulations and if not already required as part of CEQA mitigation. Recommended idling limit is 3 minutes.	Prohibit idling of heavy duty off-road construction vehicles to no more than 3 minutes.	**3,068**
Off Road-2	**Landscaping Equipment:** This measure supports reductions in gasoline-powered landscaping equipment use and/or reduces the number and operating time of such equipment community-wide. In addition, 75% of landscaping equipment in the City to be electric by 2020 and 100% by 2030.	Support landscape equipment replacement programs to replace 75% of all landscaping equipment with electric equipment (945 total pieces of landscaping equipment replaced). This measure saves approximately 532,000 gallons of gasoline.	**4,621**
Total GHG Reductions in Off-Road Equipment in 2020			**28,166**

[a] For a complete description of the MCAP measures, please see the City of Ontario Municipal Climate Action Plan.

3.8 Agriculture

Livestock emissions occur both due to enteric fermentation (livestock digestion) and manure management. This is a voluntary measure that encourages dairies and other livestock facilities in Ontario to reduce CH_4 and N_2O emissions and to promote methane reuse for energy, where feasible.

As a voluntary measure, the City would support dairies (and other animal operations) to consider existing and new technologies to control emissions from enteric fermentation and manure management and assess the feasibility of these technologies. Dairies would be encouraged to explore new technologies and implement feasible manure digestion projects based on their own local conditions and operations. The City would assist in seeking local, regional, state, and/or federal grants to help offset capital costs, linking dairies to new research opportunities, and working with local partners to help assess the feasibility of reduction projects.

The targets for reducing emissions under this measure are aspirational and voluntary, similar to the voluntary State measure for reducing agricultural emissions in California outlined in the Scoping Plan (measure A-1, *Methane Capture at Large Dairies*). Adoption of Agriculture-1 in the CCAP does not bind the City into making mandatory requirements for dairy operators. Just as in the scoping plan, given challenges of methane collection and digestion across the state, the GHG reductions presented below may or may not be feasible to achieve by 2020. Similar to the effort at the state level, the purpose of including this measure in the CCAP is to explore what can feasibly be done to reduce livestock emissions. If the reductions for this measure cannot be achieved due to technical, financial, economic or other reasons and the City is still short of its CAP target, the City would have to look at other means to meet the CAP target as part of the CAP update process (see Chapter 4 for more details on CAP updates).

The BAU forecast assumed a 9% decrease in the number of cattle from 2008 to 2020 (see Appendix A for a complete description of the Agriculture sector, including growth assumptions). This projection was based on the best available data at the time that the inventory and forecast was completed. It is possible that the actual number of cows will decrease by more than 9% by 2020 depending on market conditions and unanticipated development within the city. There may also be new dairies or animal operations coming into the city between now and 2020 that were not previously accounted for. As part of this measure, and as part of the CAP update process (which the city will conduct every 3 years), the City will reassess dairy and livestock emissions moving forward and work with the dairies that are present when this measure is implemented to consider existing and new technologies to control emissions from dairy cows and livestock and assess the feasibility of these technologies.

Methane capture from livestock could result in reductions in GHG emissions associated with agriculture in 2020 of approximately 80,000 MT CO_2e (Table 3-8). A discussion regarding technologies including manure management and enteric fermentation is provided below.

Table 3-8. GHG Reduction Measures in the Agriculture Sector

	GHG Reduction Measures	GHG Reductions Achieved by 2020 (MT CO_2e)
Agriculture-1	**Methane Emissions Reduction for Animal Operations:** Support the dairy industry (and other animal operations) to consider existing and new technologies and methods to control emissions from enteric fermentation and manure management and assess the feasibility and cost effectiveness of these technologies. Animal operations should strive to capture as much methane from manure management as feasible. Captured biogas can also be used in place of natural gas for heating, converted to vehicle fuel, used to replace gasoline and diesel, or combusted in a generator to produce renewable electricity.	80,352
Total GHG Reductions in Agriculture in 2020		**80,352**

Manure Management

The most common technology for reducing GHG emissions from manure management is manure collection and processing in an anaerobic digester. Captured biogas from the digester can be used in place of natural gas for heating, converted to vehicle fuel, used to replace gasoline and diesel, or combusted in a generator to produce renewable electricity which can then be used onsite or sold to the local utility.

Successful manure digestion projects must consider how site-specific conditions influence the characteristics of the manure, including the solids content and biogas potential. A key factor in system design is the moisture content of the manure, which is influenced by the housing system, environmental conditions, and type of bedding. Manure collection and conveyance is also important, since the frequency of collection can affect the biogas content of manure.

The dairies in Ontario are primarily dry-lot dairies, where traditional anaerobic digestion of manure (which rely on daily flushing of manure from free-stall enclosures to centralized lagoons) can be challenging to implement. In Ontario, the high presence of solids in dry lot manure and the infrequency of manure collection are two barriers to successful manure digestion projects. Other barriers to implementation include air quality permitting of the digesters and combustion engines and the availability of water to improve the quality of the manure for digestion.

In 2006, the IEUA developed and implemented a manure anaerobic digestion demonstration project for the collection and treatment of dairy manure from 14 dairy farms in Chino Basin. A Modified Mix Plug Flow system was used for digestion and to generate electricity from the captured methane. The system reduced manure management emissions of CH4 by 21% and N2O by 95%, and overall GHG emissions by 58% (Bartram et. al. 2004). The system also generated 120,970 kWh of electricity per month, enough to cover 75% of the digester's power requirement and 50% of the electricity demands of a desalter that purifies groundwater for drinking (Dairy Herd Management 2002). With funding from the Dairy Power Production Program and additional grant funding, the simple payback period was estimated to be 6.6 years (Western United Resource Development, Inc. 2009). Although the system eventually shut down due to technological problems, this program demonstrates the feasibility of implementing digestion at dry lot dairies in the region. Long-term cost effectiveness in absence of grant funding has yet to be demonstrated.

Anaerobic digestion of manure also has other co-benefits besides reducing GHG emissions, such as improving water quality and reducing odor which can be quality of life improvements for Ontario.

Enteric Fermentation

Dairies and livestock operations are also encouraged to explore ways to reduce GHG emissions from enteric fermentation, which represents a large source of emissions in Ontario. Potential methods for reducing these emissions include manipulating animal diet to inhibit a rumen environment favorable to methanogens. A range of potential emission mitigation options include dietary oils (such as whole cottonseed oil, sunflower oil, coconut oil, and palm oil), the use of corn or legume silage in place of grass silage, use of concentrate feeds, nitrates, ionophores, tannins, and improving forage quality and the overall efficiency of dietary nutrient use (Historv et. al 2013: 5045; Center for Climate and Energy Solutions 2009). As one example, some studies have indicated that the use of dietary oils can reduce CH4 emissions by up to 6 to 22% (Center for Climate and Energy Solutions 2009). The long-term effects of many of these practices have not been well established and further research is needed, but a number of options exist for reducing GHG emissions from enteric fermentation.

Under this measure, the City would work with dairy and livestock operators to test potential feasible and cost-effective approaches suitable for application in Ontario. The City would help to identify grant sources of funding to help in piloting and demonstrating promising approaches with voluntary dairy/livestock operator participation.

3.9 Water Transport, Distribution, and Treatment

The transport and use of water by residents and businesses in the City utilizes significant amounts of energy, which in turn leads to GHG emissions. The City can take measures to both reduce the use of water and increase the efficiency of its water-related infrastructure. Measures to reduce water consumption and improve water transport efficiency would reduce emissions of GHGs by approximately 6,500 MT CO_2e in 2020 (Table 3-9).

Table 3-9. GHG Reduction Measures in the Water Transport, Distribution, and Treatment Sector

GHG Reduction Measures		Simple Definition	GHG Reductions Achieved by 2020 (MT CO_2e)
Muni-5	**Municipal Water Measures:** Implement measures that contribute toward community reductions and do not overlap with other community measures. This includes *PM Water-4.*	N/A	**272**
Water-1	**Water Conservation for Existing Buildings:** Implement a program to renovate existing buildings to a higher level of water efficiency. Require 25% of existing buildings within the community to achieve a 25% reduction in water use. This measure will reduce both indoor and outdoor water use.	15,282 existing residential units to reduce total water use (indoor + outdoor) by 25% for a total savings of 459 MG (30,000 gallons/home). 25% of existing non-residential units to reduce total water use (indoor + outdoor) by 25% for a total savings of 698 MG.	**2,038**
Water-2	**Outdoor Irrigation Monitoring and Management System:** Install a water monitoring and management system (Smart	Support programs to reduce residential outdoor water use by 867 MG and non-residential	**2,804**

GHG Reduction Measures		Simple Definition	GHG Reductions Achieved by 2020 (MT CO_2e)
	controllers, etc.) for all of the City's irrigation needs to reduce the City's outdoor water consumption by 10% by 2020.	outdoor water use by 1,455 MG.	
Water-3	**Water System Efficiency:** Maximize efficiency at drinking water treatment, pumping, and distribution facilities, including development of off-peak demand schedules for heavy commercial and industrial users. Design and implement peak load management and demand response programs for water supply, treatment, and distribution, including interface with existing automated systems for building energy management and SCADA systems.	N/A	NQ
Water-4	**SB X7:** SB X7 was enacted in November 2009 and requires urban water agencies throughout California to increase water conservation to achieve a statewide goal of a 20% reduction in urban per capita use by December 31, 2020.	Reduce City-wide water use by 936 MG under the direction of the City of Ontario 2010 Urban Water Management Plan.	1,397
Total GHG Reductions in Water Transport, Distribution, and Treatment in 2020			6,511

3.10 SF_6 from Electricity Consumption

By reducing overall demand for electricity in the City, SF_6 emission reductions from electricity transmission are also reduced. However, because these emissions are not associated with one particular measure, no measure number was assigned. SF_6 reductions would result in a decrease in GHG emissions of approximately 1,700 MT CO_2e.

Table 3-10. GHG Reduction Measures in SF_6 from Electricity Consumption

GHG Reduction Measures		GHG Reductions Achieved by 2020 (MT CO_2e)
2008 SF_6 from Electricity Consumption Emissions		5,310
N/A	These reductions represent SF_6 emission reductions from electricity transmission as a result of all measures that reduce the grid electricity demand in Ontario in 2020. These measures include those in the building energy, renewable energy, wastewater, and water categories. These reductions are not associated with one particular measure, and therefore no measure number is assigned.	1,678
Total GHG Reductions in SF_6 from Electricity Consumption in 2020		1,678

3.11 Miscellaneous

There are a variety of additional measures that can help reduce emissions above and beyond the amount quantified in this CAP. However, due to insufficient data, these reductions were not quantified. These measures could lead to GHG reductions in 2020, but the amount of reductions is unknown. Potentially beneficial but unquantifiable miscellaneous measures are described in Table 3-11.

Table 3-11. Miscellaneous GHG Reduction Measures

GHG Reduction Measures		GHG Reductions Achieved by 2020 (MT CO_2e)
Misc-1	**Climate Change Awareness:** Utilize a variety of media outlets to promote climate change awareness and GHG reduction.	NQ
Misc-2	**Carbon Sequestration:** Establish a City-wide carbon sequestration project and sequestration goal of 1,000 MT CO_2 per year.	NQ
Misc-3	**Shade Tree Planting:** Promote the planting of shade trees and establish shade tree guidelines and specifications. Plant 1,000 trees per year from 2012–2020 for a total of 9,000 trees by 2020.	NQ
Misc-4	**Refrigeration and Air Conditioning Disposal:** Institute an ordinance requiring residences, businesses, and City facilities to practice RAD for all decommissioned units, including refrigerators/freezers, window air-conditioning units, and dehumidifiers.	NQ
Misc-5	**Pervious Paving:** Promote the use of pervious concrete for pavement projects. Explore grant funding opportunities for pervious concrete.	NQ
Misc-6	**Infiltration:** Promote onsite infiltration, as required by the NPDES Permit. Promote the use of pervious concrete and asphalt for pavement and parking lot projects.	NQ
Total Miscellaneous GHG Reductions in 2020		NQ

CITY OF ONTARIO

Community Climate Action Plan

Chapter 4: Implementation of the CAP

Chapter 4
Implementation of the CAP

The success of the Community CAP will depend on cooperation, commitment, and participation by all City departments and employees. This section outlines key steps the City will follow in order to ensure that the measures presented in the Community CAP that are sufficient to meet the reduction target by 2020 are implemented, and that the City achieves GHG reductions.

Implementation of the Community CAP involves the following steps.

- Administration and Staffing.
- Financing and Budgeting.
- Scheduling.
- Coordination.
- Outreach and Education.
- Monitoring, Reporting, and Adaptive Management.
- Planning for 2020 and beyond.

The following sections describe the City's plan to implement the Community CAP programs. To meet the City's reduction target by 2020, Community CAP measures are to be implemented in a timely manner. Figure 4-1 demonstrates the major stages of Community CAP implementation. Specific actions associated with measure implementation are described in Section 4.3, *Scheduling*

4.1 Administration and Staffing

In January 2011, the Climate Action Plan Technical Advisory Committee (CAPTAC) was formed. The 16-member CAPTAC is composed of department directors and managers designated by the heads of each City agency and responsible for development and implementation of the Community CAP. The CAPTAC is charged with assessing and refining the measures identified in the Community CAP.

In addition to formation of the CAPTAC, the City identified the need for a sustainability position to coordinate City efforts and the development of the Community CAP. The City appointed a Sustainability Program Manager in July 2010 to coordinate and implement the Community CAP efforts and sustainability programs. This individual serves as the CAPTAC team leader and is responsible for the coordination of the CAPTAC, community outreach support, in addition to implementing the Community CAP. Additional responsibilities of the Sustainability Program Manager include the following.

- Establishing guidelines for reporting and documenting emission reduction progress.
- Developing the protocol for monitoring the effectiveness of the reduction measures.
- Investigating methods for utilizing existing resources and harnessing employee support to better streamline implementation of the Community CAP.
- Coordinating and assisting in securing long-term financing for reduction programs.

- Conducting periodic outreach efforts to inform and involve the employees and community of the City's community and municipal GHG reduction measures.
- Serving as the external communication hub to local and regional organizations related to climate change including the San Bernardino Associated Governments (SANBAG) and SCAG.

City staffing for the CAPTAC includes the Sustainability Program Manager and the following primary agency/departments.

- **Development Agency:** Planning, Building and Landscape Departments will provide expertise in evaluating and managing community impacts of the CAP. The Engineering Department, is responsible for implementation of streetlight and traffic signal measures.
- **Ontario Municipal Utilities Company:** Responsible for facilitating implementation of water efficiency and solid waste measures.
- **Community Services:** The Maintenance Department, located within Community Services, is responsible for implementation of energy/water efficiency measures for outdoor public facilities.
- **City Administration:** The Human Resources Department, located within City Administration, is responsible for providing expertise in ride-share activities and sub-regional coordination efforts.
- **Housing and Municipal Services:** Responsible for supporting implementation of energy/water efficiency measures for building facilities, vehicle fleet, and low income housing.
- **Administrative Services:** Provides expertise in evaluating and managing the economic impacts of selected measure implementation.

CAPTAC members may alternate or be added as needed to ensure coordinated and effective leadership.

4.2 Financing and Budgeting

Implementation of the Community CAP will require interagency collaboration from strategic public funding by the City, regional government agencies, to the state for capital projects coupled with local businesses, developers/builders, residential homeowner cooperation. One of the first priorities for implementing the Community CAP will be to assess the ongoing or planned activities currently anticipated within the City that make a direct or indirect contribution to GHG reduction. Funding sources have not been identified for all actions; however, numerous federal state, and regional sources may be available.

The cost of implementing the GHG reduction measures identified in the Community CAP will take into account the costs and anticipated staff time as well as the benefit and cost savings of the proposed implementation measure. The CAPTAC will pursue outside funding sources and/or programs that support the CAP measures to the extent feasible. A variety of federal, regional, state, and local funds should be considered for Community CAP financing. Several potential financing sources have been identified.

- Federal Tax Credits for Energy Efficiency
- Power purchase agreements
- Energy Efficient Mortgage
- California Department of Resources Recycling and Recovery
- California Air Resources Board
- Department of Water Resources recycled water, capital improvements, and onsite retrofits
- Air Quality Management District fleet grants related to natural gas
- Chino Basin Desalter Authority Joint Powers Authority
- Southern California Edison Energy-Efficient/Renewable Energy Incentives
- California Solar Initiative
- ARB Renewable Energy Credits
- Community Development Block Grant
- Resource Conservation Funds 2009
- California Integrated Waste Management Board grants and funds
- Clean Water State Revolving Funds
- Inland Empire Utility Agency
- Community Facilities District
- SANBAG HERO Program October 2013

Additional potential sources will be identified as new opportunities become available.

4.3 Scheduling

To ensure all reduction measures are implemented as seamlessly as possible, an implementation schedule has been developed. Figure 4-1 outlines the key priorities and anticipated timelines for the implementation phase, while Table 4-1 provides the phase in which each implementation measure will be initiated, along with potential funding sources and the department charged with implementing each measure. A simple definition of each measure is also provided.

Figure 4-1. Implementation Timeline

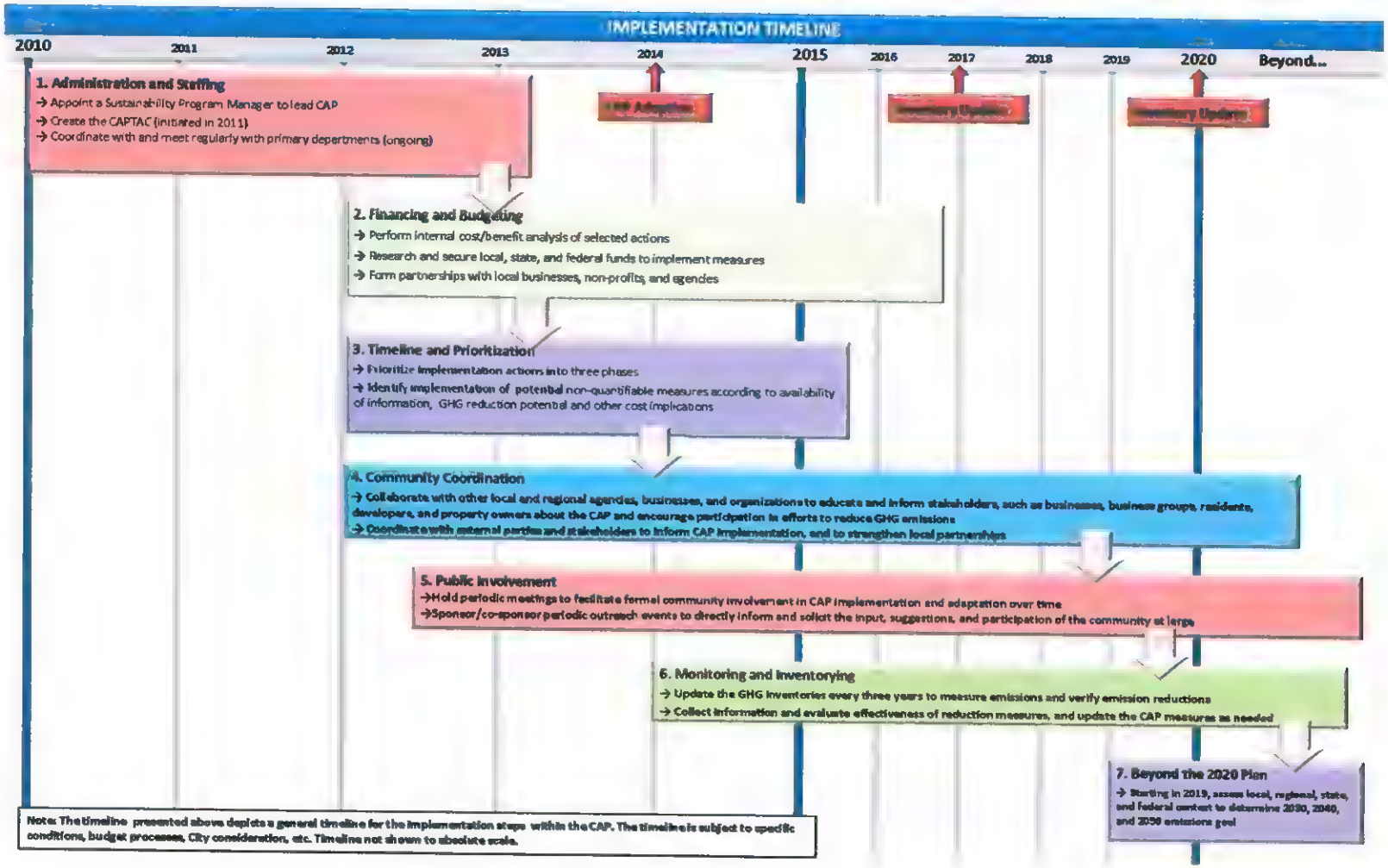


Table 4-1. Phasing, Lead Department, and Potential Funding for Implementation Measures

Measure Number and Description[a]	Phase of Initial Implementation	Potential Funding Source[b]	Lead Department[c]
Performance Standard For New Development			
PS-1: New projects emitting more than 3,000 MT CO_2e per year need to reduce emissions by 25%. Refer to Appendix C for more information.	2014–2020	Grants/ tax credits/ impact fees/ rebates/ private funding	DEV
BMP-1: New projects emitting less than 3,000 MT CO_2e per year to exceed Title 24 Energy Efficiency Standards by at least 5%, or equivalent level of GHG emission reduction	2014–2020	Grants/ tax credits/ private funding	DEV
Building Energy			
Energy-1: CAP Consistency: Ensure that the City's local Climate Action, Land Use, Housing, and Transportation Plans are aligned with, support, and enhance any regional plans that have been developed consistent with state guidance to achieve reductions in GHG emissions.	2014–2020	N/A	DEV, HMS
Energy-2: Regional Cooperation: Coordinate with special districts, nonprofits, and other public organizations to share resources, achieve economies of scale, and develop green building policies and programs that are optimized on a regional scale.	2014–2020	SANBAG	DEV, HMS
Energy-3: Energy Efficient Funding for Existing Low Income Residents: Partner with community services agencies to fund energy efficiency projects. Retrofit 4,903 existing single-family and multi-family low income homes to save 2,632,164 kWh and 23,216 therms (537 kWh and 5 therms per home). This represents a 27% penetration rate for low income homes.	2014–2020	Grants/ tax credits/ private equity	DEV, HMS

Measure Number and Description[a]	Phase of Initial Implementation	Potential Funding Source[b]	Lead Department[c]
Energy-4: Energy Efficient to Promote Retrofits for Existing Residential Buildings: Incentivize, or otherwise support, voluntary energy efficiency retrofits of existing residential buildings to achieve reductions in natural gas and electricity usage. Retrofit 7,684 single-family homes and 5,322 multi-family homes.	2014–2020	Grants/ tax credits/ private equity	DEV HMS
Energy-5: Energy Efficient to Promote Retrofits for Existing Non-Residential Buildings: Voluntary programs for existing non-residential facilities improve building-wide energy efficiency by 20% by 2020. Retrofit 27% of existing non-residential buildings to save 52.7 million kWh and 3.3 million therms.	2014–2020	Grants/ tax credits/ private equity	DEV
Energy-6: Streetlights: Adopt outdoor lighting standards to reduce electricity consumption. Require 40% reduction in energy use from traffic signals and streetlights by 2020. Reduce streetlight and traffic signal electricity use by 40% to save 14.3 million kWh.	2014–2020	Grants/CIP	DEV, HMS
Renewable Energy			
Renewable Energy-1: Solar Installation for Existing Non-Residential for Major Rehabilitations or Expansions: Install solar photovoltaic panels on nonresidential buildings greater or equal to 25,000 square feet in size requiring discretionary permits for major rehabilitations or expansions (additions of 25,000 square feet of office retail/commercial or 100,000 square feet of industrial/warehouse floor area). Install solar panels on the roofs of 4.1 million square feet of existing commercial buildings and 1.5 million square feet of existing industrial/warehouse buildings	2014–2020	Grants/ tax credits/ private funding	DEV
Renewable Energy-2: Solar Installation in Existing Single Family Housing: Install solar panels on 22% of existing single-family homes by 2020. Install solar panels on 6,261 existing single-family residences, for a total of 32 MW of solar.	2014–2020	Grants/ tax credits/ private funding	DEV

Measure Number and Description[a]	Phase of Initial Implementation	Potential Funding Source[b]	Lead Department[c]
Renewable Energy-3: Solar Installation in Existing Nonresidential Buildings: Install solar panels on 32% of existing nonresidential buildings by 2020. Install solar panels on the roofs of 12.8 million square feet of existing commercial and 8.6 million square feet of existing industrial/warehouse buildings, for a total of 137 MW of solar.	2014–2020	Grants/ tax credits/ private funding	DEV
Wastewater Treatment			
Wastewater-1: Recycled Water: Require 50% of all water used for non-potable sources to be recycled water by 2020. Require all new parks and schools to use 100% recycled water for non-potable outdoor uses, as feasible. Develop public educational materials that support and encourage the use of recycled water. Adopt a City Municipal facility goal of 50% use of recycled water for non-potable sources.	2015–2020	Public utility/ rate increase	OMUC
Wastewater-2: Waste-to-energy/Methane Recovery: Encourage IEUA to implement waste-to-energy projects at the IEUA RP-1 wastewater treatment plant by 2020, and to utilize collected gas to fuel onsite stationary sources.	2018–2020	Public utility/ rate increase	OMUC
Solid Waste Management			
Waste-1: Waste Diversion: Divert 75% of City-generated waste from landfills.	2014–2020	Grants/fees	OMUC
Waste-2: Construction and Demolition Waste Recovery Ordinance: Implement an ordinance requiring building projects to recycle or reuse at least 50% of unused or leftover building materials.	2015–2020	Grants/fees	OMUC
On-Road Transportation			
Trans-1: Expand Public Transportation Infrastructure: Work with appropriate agencies to create an interconnected transportation system that allows a shift in travel from private passenger vehicles to alternative modes, including public transit, ride sharing, car-sharing, bicycling and walking.	2014–2020	Grants/CIP/ fare increase/ private partnerships	DEV

Measure Number and Description[a]	Phase of Initial Implementation	Potential Funding Source[b]	Lead Department[c]
Trans-2: Transit Frequency and Speed: To the extent feasible, support shorter transit passenger travel time through reduced headways and increased speed. Support regional transit operator to reduce average fleet travel time by 5 minutes.	2015–2020	Grants/CIP/ fare increase/ private partnerships	DEV
Trans-3: "Smart Bus" Technology: Collaborate with LA Metro, Metrolink, and Omnitrans to implement "Smart Bus" technology.	2014–2020	Grants/CIP/fare increase/private partnerships	DEV
Trans-4: Expand Public Transportation Participation: Collaborate with regional transit operator on programs to increase use of the City's public transportation system.	2014–2020	Grants/CIP/fare increase/private partnerships	DEV
Trans-5: Low- and Zero-Emission Vehicles: Support and promote the use of low-and zero-emission vehicles in the City.	2014–2020	Grants/CIP/fare increase/private partnerships	DEV
Trans-6: Vehicle Idling: Prohibit idling of Heavy Duty Trucks (greater than 26,000 gross vehicle weight) for longer than 3 minutes.	2016–2020	Grants/CIP/fare increase/private partnerships	DEV
Trans-7: Parking Policy: Adopt a comprehensive parking policy that encourages carpooling and the use of alternative transportation, including providing parking spaces for car-share vehicles at convenient locations accessible by public transportation. Consider requirements for the following to reduce VMT within the City by 2%. Designate 5% of downtown parking spaces for ride-sharing vehicles.	2016–2020	Grants/CIP/ taxes	DEV
Trans-8: Event Parking: Consider establishing policies and programs to reduce onsite parking demand and promote ride-sharing during events at the Ontario Convention Center and other event venues. Consider a goal to reduce VMT at major events by 2%.	2014–2020	Parking fees/ taxes	DEV/AS
Trans-9: Roadway Management: Implement traffic and roadway management strategies to improve mobility and efficiency, and reduce associated emissions. Consider a goal to reduce community vehicle fuel consumption by 2%.	2015–2020	Grants/CIP	DEV

Measure Number and Description[a]	Phase of Initial Implementation	Potential Funding Source[b]	Lead Department[c]
Trans-10: Signal Synchronization: Evaluate potential efficiency gains from further signal synchronization. Synchronize traffic signals throughout the City and with adjoining cities while allowing free flow of mass transit systems. Require continuous maintenance of the synchronization system. Consider a goal to reduce City-wide vehicle fuel consumption by 2%.	2015–2020	Grants/CIP	DEV
Trans-11: School Transit Plan: Encourage local school districts to develop school transit plans to substantially reduce automobile trips to, and congestion surrounding, schools. (According to some estimates, parents driving their children to school account for 20–25% of the morning commute.) Plans may address, e.g., necessary infrastructure improvements and potential funding sources, replacing older diesel buses with low or zero-emission vehicles, mitigation fees to expand school bus service, Safe Routes to School programs, and other formal efforts to increase walking and biking by students. Although this measure is not within the City's authority, Ontario can work with local school districts to develop these plans.	2014–2020	Grants/CIP/ taxes	DEV
Trans-12: Ridesharing Programs: Coordinate with local agencies to promote ride sharing programs in Ontario (CAPCOA 2010). Although the City does not have the legal authority to impose trip demand management programs on project applicants or employers, Ontario can work with local agencies to develop these programs. Consider a goal to reduce City-wide VMT by 2% through mode-shifts from single-occupancy vehicles to carpools.	2014–2020	Grants/CIP/ fare increase/ private partnerships	DEV, AS
Trans-13: Bicycle and Pedestrian Infrastructure Plan: Adopt a comprehensive bicycle and pedestrian infrastructure plan to expand the City's bicycle and pedestrian network. This plan would encourage residents and employees to use bicycling and walking as a method of transportation. Consider a goal to reduce City-wide VMT by 2% through mode-shifts from single-occupancy vehicles to bicycles.	2014–2020	Grants/CIP/ taxes	DEV

Measure Number and Description[a]	Phase of Initial Implementation	Potential Funding Source[b]	Lead Department[c]
Trans-14: Development Standards for Bicycles: Establish standards for new development and redevelopment projects to support bicycle use. Consider a goal to reduce VMT resulting from new development by 4% through mode-shifts from single-occupancy vehicles to bicycles.	2014–2020	Grants/CIP/ taxes	DEV
Trans-15: Smart Growth and Infill: Encourage high-density, mixed-use, infill development and creative reuse of brownfield, under-utilized and/or defunct properties within the urban core. Consider a goal to reduce VMT resulting from new development by 5%.	2015–2020	Grants	DEV
Trans-16: Transit-Oriented Development: Identify transit centers appropriate for mixed-use development, and promote transit-oriented, mixed-use development within these targeted areas. Consider a goal to reduce VMT resulting from new development by 2%.	2015–2020	Grants/CIP	DEV
Off-Road Equipment			
Off Road-1: Heavy Duty Vehicle Idling Ordinance: Adopt an ordinance that requires idling of heavy duty off-road construction vehicles to no more than 3 minutes.	2015-2020	Grants/ private equity	DEV, HMS, CS
Off Road-2: Landscaping Equipment: Support landscape equipment replacement programs to replace 75% of all landscaping equipment with electric equipment (945 total pieces of landscaping equipment replaced). This measure saves approximately 532,000 gallons of gasoline.	2014-2020	Grants/ incentives/ private equity	DEV, HMS, CS
Agriculture			

Measure Number and Description[a]	Phase of Initial Implementation	Potential Funding Source[b]	Lead Department[c]
Agriculture-1: Methane Emissions Reduction for Animal Operations: Support dairies (and other animal operations) to consider existing and new technologies and methods to control emissions from enteric fermentation and manure management and assess the feasibility and cost effectiveness of these technologies. Animal operations should strive to capture as much methane from manure management as feasible. Captured biogas can also be used in place of natural gas for heating, converted to vehicle fuel, used to replace gasoline and diesel, or combusted in a generator to produce renewable electricity.	2018-2020	Grants/private	DEV
Water Transport, Distribution, and Treatment			
Water-1: Water Conservation for Existing Buildings (Indoor + Outdoor): Require 25% of existing buildings within the community to achieve a 25% reduction in water use. This measure will reduce both indoor and outdoor water use. A total of 15,282 existing residential units to reduce total water use (indoor + outdoor) by 25% for a total savings of 459 MG (30,000 gallons/home). 25% of existing non-residential units to reduce total water use (indoor + outdoor) by 25% for a total savings of 698 MG.	2016–2020	Grants/ rebates/ private equity	DEV, HMS, CS
Water-2: Irrigation Monitoring and Management System (Outdoor): Install a water monitoring and management system (Smart controllers, etc.) for all of the City's irrigation needs to reduce the City's water consumption by 10% by 2020.	2015–2020	Impact fees/grants	DEV, HMS,CS
Water-3: Water System Efficiency: Design and implement peak load management and demand response programs for water supply, treatment, and distribution, including interface with existing automated systems for building energy management and SCADA systems.	2015–2020	Public utilities/grants	OMUC
Water-4: SB X7: Urban water agencies throughout California are required to increase water conservation to achieve a statewide goal of a 20% reduction in urban per capita use by 2020 per SB X7. The Ontario 2010 Urban Water Management Plan outlines the approaches to achieving that reduction.	2014–2020	Grants/ rebates/ private equity	OMUC
Miscellaneous			

Measure Number and Description[a]	Phase of Initial Implementation	Potential Funding Source[b]	Lead Department[c]
Misc-1: Climate Change Awareness: Utilize a variety of media outlets to promote climate change awareness and GHG reduction.	2014–2020	Grants/CIP	DEV
Misc-2: Carbon Sequestration: Establish a City-wide carbon sequestration project and sequestration goal of 1,000 MT CO_2 per year.	2018–2020	Grants	DEV, CS
Misc-3: Shade Tree Planting: Promote the planting of shade trees and establish shade tree guidelines and specifications.	2014–2020	Grants/CIP	DEV,CS
Misc-4: Refrigeration and Air Conditioning Disposal: Institute an ordinance requiring residences, businesses, and city facilities to practice RAD for all decommissioned units, including refrigerators/freezers, window air-conditioning units, and dehumidifiers.	2015–2020	Grants/ businesses	OMUC
Misc-5: Pervious Paving: Promote the use of pervious concrete for pavement projects. Explore grant funding opportunities for pervious concrete.	2015–2020	Grants/CIP	HMS, CS, DEV
Misc-6: Infiltration: Promote onsite infiltration, as required by the NPDES Permit. Promote the use of pervious concrete and asphalt for pavement and parking lot projects.	2015–2020	CIP	DEV, CS

[a] Only local measures for which emissions could be quantified are listed here. Additional state measures and measures that could contribute to GHG emissions, but for which emissions could not be quantified, are detailed in Chapter 3.

[b] CIP funding sources may include any of the following; general fund, internal services fund and/or Enterprise fund.

[c] **Key:** AS = Administrative Services, DEV=Development Agency, HMS=Housing & Municipal Services Agency, OMUC = Ontario Municipal Utilities Company, CS=Community & Public Services Agency, IT=Information Technology Agency

4.4 Coordination and Outreach

The citizens and businesses within the City of Ontario are integral to the success of the CAP. Their involvement is essential, considering that several measures depend on the voluntary commitment, creativity, and participation of the community.

The City would collaborate with other local and regional agencies, businesses, and organizations to educate and inform stakeholders, such as businesses, business groups, residents, developers, and property owners about the CAP and encourage participation in efforts to reduce GHG emissions. The City would schedule periodic meetings to facilitate community involvement in CAP implementation and adaptation over time. These meetings would be targeted to stakeholder groups and provide information on CAP implementation progress. Stakeholders would be provided an opportunity to comment on potential improvements or changes to the CAP. The City, in partnership with other organizations, would also sponsor/co-sponsor periodic outreach events to directly inform and solicit the input, suggestions, and participation of the community at large.

4.5 Regional Involvement

There are substantial opportunities to enhance the effectiveness of the CAP through regional collaboration. The City is an active participant in SANBAG's efforts to leverage its role as a transportation planning agency and the regional scope of its authority to reduce GHG emissions in several emissions sectors in the region. As part of this partnership, several opportunities to explore the potential to leverage resources are provided to support implementation of the CAP. Potential opportunities and partners include the following.

- **San Bernardino Association of Governments (SANBAG)**
  - **San Bernardino County Regional Greenhouse Gas Reduction Plan**—The City of Ontario is one of 22 partnership cities participating in the development of a sub-regional GHG Reduction Plan that includes a current year (2008) GHG emissions inventory, future year (2020) GHG emissions forecast, City 2020 reduction goal, and GHG reduction measures. The intent is to develop consistent baseline information for jurisdictions to use for their development of community climate action plans.
  - **Municipal Regional Joint Solar Power Purchase Agreement Program**—The City of Ontario is one of the member cities participating in a Joint Procurement for Solar Photovoltaic Systems. The program brings together a number of cities and other government agencies to aggregate their solar sites, and then those that make technical and economic sense are bundled together and negotiate a power purchase agreement.
  - **Property Assessment Clean Energy (PACE) Program**—The City of Ontario is one of the member cities participating in the regional energy efficiency and water conservation improvements loan program as defined by AB 811 and AB 474 and commonly referred to as a PACE Program. SANBAG has completed the process and launched the HERO Program in October 2013.
- **Southern California Edison (SCE)**—SCE offers numerous incentives and rebate programs to encourage energy efficiency. Resources offered by SCE may reduce program implementation and administration costs. There may also be opportunities for cooperation on community-scale alternative energy installations (e.g., wind, solar).
- **Southern California Gas Company (SCGC)**—SCGC offers numerous incentives and rebate programs to encourage energy efficiency. Resources offered range from Energy Efficient Starter Kits to the High Efficiency Hot Water Distribution Program (Solar). There may also be opportunities for cooperation on community-scale energy efficiency programs and alternative energy installations (e.g., solar water heaters).
- **Inland Empire Utilities Agency (IEUA)**
  - **Residential Conservation Rebates**—the Inland Empire Utilities Agency (IEUA) offers rebates for the purchase of residential water conservation appliances and equipment including: high efficiency clothes washers, SmartTimer controllers for lawns, and high efficiency sprinkler nozzles. IEUA also offers free landscape evaluations and a high efficiency toilet installation co-pay program.
  - **Commercial Conservation Rebates**—IEUA offers rebates for the purchase of commercial water conservation appliances and equipment including: toilets and urinals, laminar flow

restrictors, connectionless food steamers, cooling towers, dry vacuum pumps, air cooled ice machines, smart controllers for irrigation, high efficiency sprinkler nozzles, large rotary nozzles for irrigation, and in-stem flow regulators. IEUA also offers free landscape evaluations and a high efficiency toilet installation co-pay program.

  - **Water Calculator**—Through IEUA's website, residents and businesses can calculate their annual water usage using the H_2O Conserve Water Calculator.
  - **Landscaping**—IEUA provides the following water conservation resource materials related to landscaping: how to use irrigation controllers and leading manufacturers of controllers; a guide to edible landscaping; a database of California friendly plants; a cost comparison for California native and drought-tolerant plants versus exotic plants from the East Coast; and other materials.

- **SANBAG Long Range Transportation**—In order to fully implement the transportation reduction measures that promote mixed-use development, continued coordination with regional transportation agencies would be necessary. With SB 375 and its linkage to transportation funding, it would also be crucial for the City and transportation agencies to develop a shared vision of how transportation and land use can be consistent with the next RTP and the required SCS.
- **CalRecycle**—Waste-1 includes the adoption of a 75% waste diversion goal. Coordination with the County to provide the facilities, programs, and incentives would help ensure this goal can be achieved by 2020.

4.6 Monitoring, Reporting, and Adaptive Management

Regular monitoring is important to ensure programs are functioning as they were originally intended. Early identification of effective strategies and potential issues will enable the City to make informed decisions on future priorities, funding, and scheduling. Moreover, monitoring provides concrete data to document the City's progress toward achieving its GHG emissions target. The Development Agency will be responsible for the monitoring procedures that encompass information gathering of specific CAPTAC sector measures, analyzing data and implementing monitoring tools currently being developed by SANBAG, and recommending adjustments to the CCAP. The CAPTAC will be responsible for developing the monitoring procedures for the Community CAP as opportunities arise.

The City will conduct periodic comprehensive reviews of the Community CAP on a 3-year cycle that will involve an appropriate level of re-inventorying of emission sources in order to obtain a more complete understanding of GHG conditions and results of Community CAP measure progress. The Sustainability Program Manager will compile monitoring results, and will be responsible for the coordination and development of each comprehensive update. Upon review of the Community CAP, additional measures or adjustments to existing measures will be addressed in order to continue to reduce GHG emissions.

4.7 Planning for 2020 and Beyond

While GHG management in California is currently focused on a 2020 target, Executive Order S-03-05 articulates a GHG reduction goal for California in 2050. Executive Order S-03-05 sets a goal that by 2050, California will reduce GHG emissions to a level that is 80% below the level of 1990. It is reasonably foreseeable that as California approaches its first milestone in 2020, focus will shift to the 2050 target. A detailed plan for how the state would meet this target is expected, and the City will monitor developments at the national and state levels to ensure it will continue to support efforts at all levels of government.

Beginning in 2018, the City would commence planning for the post-2020 period. At this point, the City would have implemented the first two phases of the Community CAP and would have a better understanding of the effectiveness and efficiency of different reduction strategies and approaches. The new post-2020 reduction plan would include a specific target for GHG reductions for 2030, 2040, and 2050. The targets would be consistent with broader state and federal reduction targets and with the scientific understanding of the needed reductions by 2050.

CITY OF ONTARIO

Community Climate Action Plan

Chapter 5: References

Chapter 5
References

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CITY OF ONTARIO

Community Climate Action Plan

Appendix A

City of Ontario 2008 Community Greenhouse Gas Emissions Inventory and 2020 Forecast

City of Ontario 2008 Community Greenhouse Gas Emissions Inventory and 2020 Forecast

April 2012

ICF Reference: 00649.10

Prepared for:

City of Ontario

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Table of Contents

List of Tables

List of Figures

Acronyms and Abbreviations

AB	Assembly Bill
BAU	business as usual
BOD	biochemical oxygen demand
CAPCOA	California Air Pollution Control Officer's Association
CARB	California Air Resources Board
CEC	California Energy Commission
CH_4	methane
CIWMB	California Integrated Waste Management Board
CO_2	carbon dioxide
County	San Bernardino County
DEIR	Draft Environmental Impact Report
EPA	U.S. Environmental Protection Agency
FMMP	Farmland Mapping and Monitoring Program
FOD	First Order Decay
GIS	Geographic Information Systems
GWP	global warming potential
GHG	greenhouse gas
GHG:ID	Greenhouse Gas Inventory Database
HCFCs	halogenated fluorocarbons
HFCs	hydrofluorocarbons
IEUA	Inland Empire Utilities Agency
IPCC	Intergovernmental Panel on Climate Change
k-value	first order decay rate constant for landfill methane equation (1/year)
kWh	kilowatt-hour

LMOP	Landfill Methane Outreach Program
LGOP	Local Governments Operations Protocol
$MTCO_2e$	metric tons of carbon dioxide equivalent
MG	million gallons
NMC	New Model Colony
N_2O	nitrous oxide
ODS	ozone depleting substances
PFCs	perfluorinated carbons
RTAC	Regional Target Advisory Committee
SANBAG	San Bernardino Associated Governments
SB	Senate Bill
SCAQMD	South Coast Air Quality Management District
SCAG	Southern California Association of Governments
SCE	Southern California Edison
SCG	Southern California Gas Company
SWP	State Water Project
TAZ	Traffic Analysis Zone
UNFCCC	United Nations Framework Convention on Climate Change
UWMP	Urban Water Management Plan
WIP	waste in place
WARM	Waste Reduction Model
WWTP	wastewater treatment plant
WER	water-energy relationship

1. Executive Summary

The City of Ontario (City) faces a demanding challenge to meet the targets established by the State of California to address global warming, through the requirements of Assembly Bill (AB) 32[1] and Senate Bill (SB) 375[2]. In response to these initiatives, the City is seeking to reduce greenhouse gas (GHG) emissions associated with its regional activities. In addition, the City is participating in a partnership with the San Bernardino Associated Governments (SANBAG) and many cities in San Bernardino County (County) to evaluate and achieve GHG emissions reductions in the County. The City has committed to undertake the following actions that will reduce GHG emissions associated with its community activities.

- Prepare a current year (2008) GHG emissions inventory for the City's community activities (Community Inventory).
- Prepare a future year (2020) GHG emissions estimate (or forecast) for the City's community activities.
- Adopt a GHG Emissions Reduction Plan that will include measures to reduce GHG emissions from community activities and that will seek to reduce emissions by at least 30% by 2020 "business as usual" (BAU) emissions[3].

In January 2010, the City approved The Ontario Plan, which provides a framework for the future community of Ontario (City of Ontario 2010). The Ontario Plan incorporates many policies and measures to improve the City's sustainability and reduce GHG emissions from City activities. The City also prepared a Draft Environmental Impact Report (DEIR) to evaluate the potential for implementation of The Ontario Plan to affect or be affected by global climate change (City of Ontario 2009). As part of the DEIR, the City conducted a community inventory for the year 2006. The Ontario Plan, DEIR, and a comparison of the 2006 inventory to the 2008 inventory are discussed in Section 2.1, *Inventory Background*.

This 2008 Community Greenhouse Gas Emissions Inventory summarizes emissions for the City of Ontario. Emissions were calculated for sectors as identified by AB 32 in the bullet above, as well as additional subsectors, including building energy use (natural gas and electricity in the residential, commercial, and industrial sectors), stationary fuel combustion (fuels besides natural gas, including industrial activities), light- and medium-duty vehicles, heavy-duty vehicles, off-road equipment, landfills and waste generation, wastewater treatment, water consumption, and agriculture (fugitive emissions from livestock and fertilizer). This 2008 inventory is a baseline from which to forecast future year 2020 emissions and establish GHG reduction targets. The 2020 emissions estimate, or forecast, represents BAU emissions. GHG reduction targets will be evaluated in subsequent documents, from which the City will develop GHG reduction goals and create a policy framework to support control and ultimate reduction of GHG emissions from the City's community activities.

[1] In 2006, California passed AB 32, the Global Warming Solutions Act of 2006. This law established a state goal of reducing GHG emissions statewide to 1990 levels by 2020. This effort is roughly equivalent to the reduction in emissions to a level 15% below current levels.

[2] SB 375 requires regional transportation plans, developed by metropolitan planning organizations (MPOs) to incorporate a "sustainable communities strategy" (SCS) in their regional transportation plans (RTPs).

[3] This plan must comply with the recommendations for local community emissions outlined in AB 32. The Plan must include climate action measures for the following sectors (as identified in AB 32): building energy, water, transportation, goods movement, waste, and stationary fuel combustion.

This report provides background information on GHG emissions in the City, the methodology used to prepare the inventory, and inventory results for each emissions sector listed above. GHGs in this inventory include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).

1.1 Inventory Definitions

Community Inventory. The community inventory includes GHG emissions occurring within the City of Ontario's geographic or jurisdictional boundaries and generally consists of sources of emissions that the City's community can influence or control[4]. The boundaries of the community inventory are geographic; emissions included, or activities associated with emissions, must occur inside of the jurisdictional boundary of the City. The year 2008 was chosen for the current community inventory because it was the most recent year with the necessary data to perform a comprehensive inventory and because it is consistent with the subregional efforts. The 2020 emissions projection represents BAU emissions associated with the City's activities in 2020.

Municipal Inventory. The municipal inventory includes GHG emissions associated with the City's services and municipal operations. This inventory is not calculated or presented in this report but is under development.

Some emission sources are included in both inventories, as there are overlaps in the operational boundaries of the two inventories. For example, in the community inventory, light–medium-duty vehicle emissions include emissions from all light–medium-duty vehicles traveling in the City. The corresponding municipal inventory category is vehicle fleet emissions, which operate mostly in the City but also may operate outside City boundaries. The overlap between the community and municipal inventories for this sector involves those City vehicle emissions that occur in the City as these emissions are accounted for in the transportation modeling. Emissions from City vehicles traveling outside City boundaries are included in the municipal inventory but not the community inventory because they are under the City's municipal jurisdiction but are not included in the transportation modeling.

Unit of Measure. The unit of measure used throughout this GHG inventory is the metric ton (MT) of CO_2 equivalent (CO_2e) This is the international unit that combines the differing impacts of all GHGs into a single unit by multiplying each emitted gas by its global warming potential (GWP). GWP is the measure of how much a given mass of GHG contributes to global warming. GWP compares the relative warming effect of the GHG in question to CO_2.[5]

Emissions Type. GHG emissions can be defined as either *direct* (emissions that occur at the end use location, such as natural gas combustion for building heating) or *indirect* (emissions that result from *consumption* at the end use location but occur at *another* location, such as emissions from residential electricity use that occur at the

[4] The Ontario International Airport was not included in the inventory because Ontario and its community have little to no jurisdiction over operations at the airport.

[5] The GWP of CO_2 is, by definition, one (1). The GWP values used in this report are based on the Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report (SAR) and United Nations Framework Convention on Climate Change (UNFCCC) reporting guidelines, and are as follows: CO2 = 1, CH4 = 21, N2O = 310, SF6 = 23,600 (Intergovernmental Panel on Climate Change 1996; United Nations Framework Convention on Climate Change 2006). Although the IPCC Fourth Assessment Report (AR4) presents different GWP estimates, the current inventory standard relies on SAR GWPs to comply with reporting standards and consistency with regional and national inventories (Intergovernmental Panel on Climate Change 2007; U.S. Environmental Protection Agency 2010a).

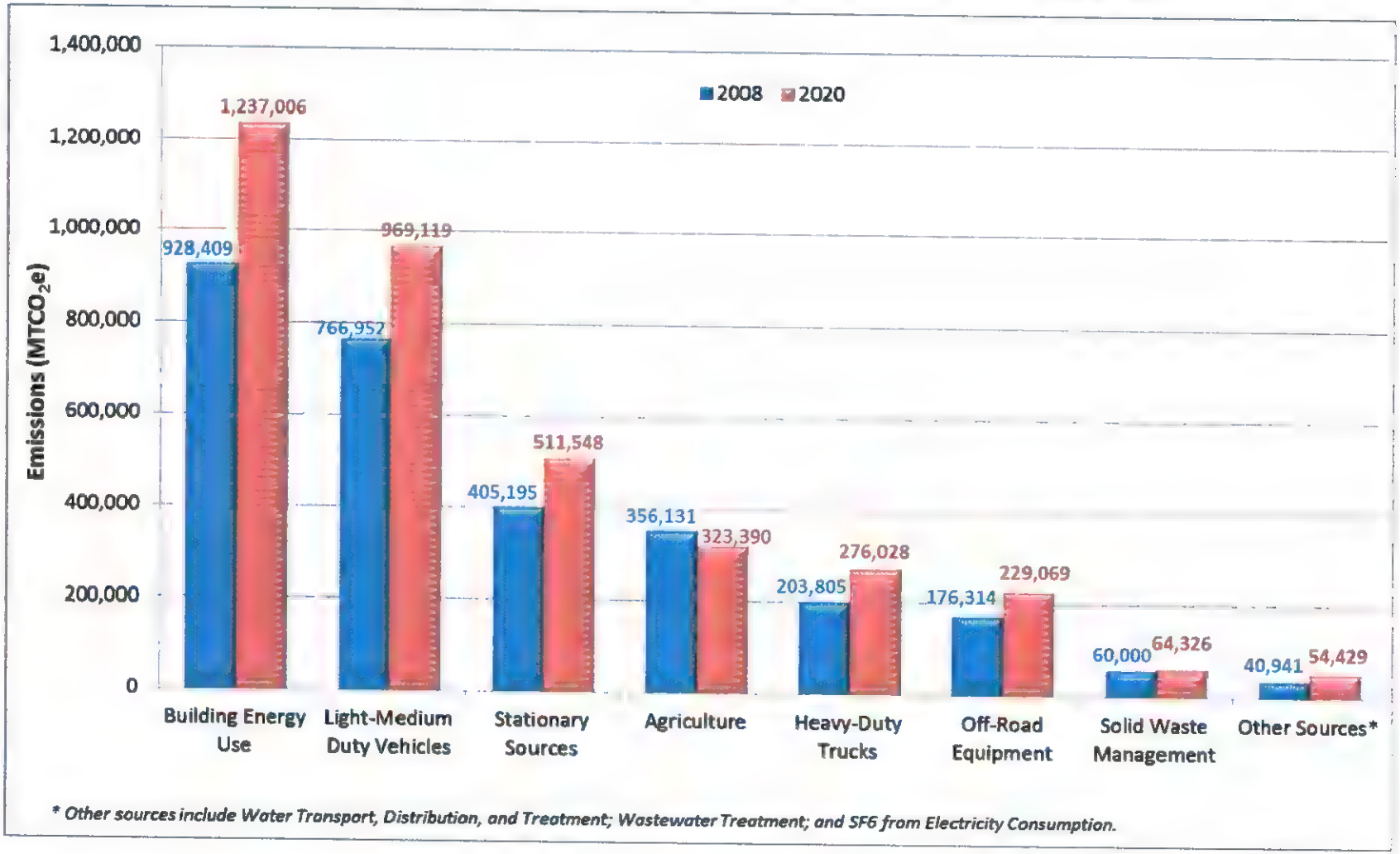
power plant itself but result from in-home appliance or other use). This report addresses both types of emissions. In addition, all references to emissions are referring to GHG emissions, not to emissions of air quality pollutants.

1.2 Inventory Results

In 2008, the largest source of community emissions for the City was building energy use, which represented 31.6% of total community emissions for 2008. This sector includes emissions associated with natural gas combustion and electricity consumption in residential, commercial, and industrial buildings in Ontario. Transportation emissions are often the largest source of emissions in community inventories, and Ontario is no exception. The second largest source of emissions was light–medium-duty vehicle emissions, which accounted for 26.1% of total community emissions for 2008. The third and fourth largest sources were stationary sources and agriculture, with a contribution of 13.8% and 12.1% of the total 2008 emissions, respectively. Stationary sources included combustion of fuels at industrial facilities and fugitive emissions from industrial processes. Agricultural emissions result from crop fertilizer use and from livestock. The remaining sources in order of greatest contribution were heavy-duty vehicles (6.9%), off-road equipment (6.0%), solid waste management (2.0%), water conveyance (1.0%), wastewater treatment (0.2%) and SF_6 emissions from electricity consumption (0.2%). Figures 1 and 2 present all GHG emissions for the City for 2008.

Community-wide, emissions are projected to increase by approximately 25% from 2008 to 2020. The increase from 2008 to 2020 will occur primarily because of an increase in building energy use, stationary source emissions, and vehicle miles traveled (VMT). As the population and employment in Ontario grow, energy consumption, industrial activity, and transportation increase. Emissions from all other sectors except agriculture will increase under the BAU scenario by 2020 because of growth in the City across all economic sectors (agricultural activity is expected to decline in the future). Emissions from individual sectors are discussed in more detail below. Figures 1 and 2 present the 2020 BAU forecast. Figure 3 presents a breakdown of minor GHG sources for 2008 and 2020, which are combined as *other sources* in Figure 1. Table 1 shows emissions for each sector and their contributions to the total inventory.

Figure 1. City of Ontario Community 2008 GHG Inventory and 2020 BAU Forecast – *By Sector*



** Other sources include Water Transport, Distribution, and Treatment; Wastewater Treatment; and SF6 from Electricity Consumption.*

Figure 2. City of Ontario Community 2008 GHG Inventory and 2020 BAU Forecast – *Total Emissions*

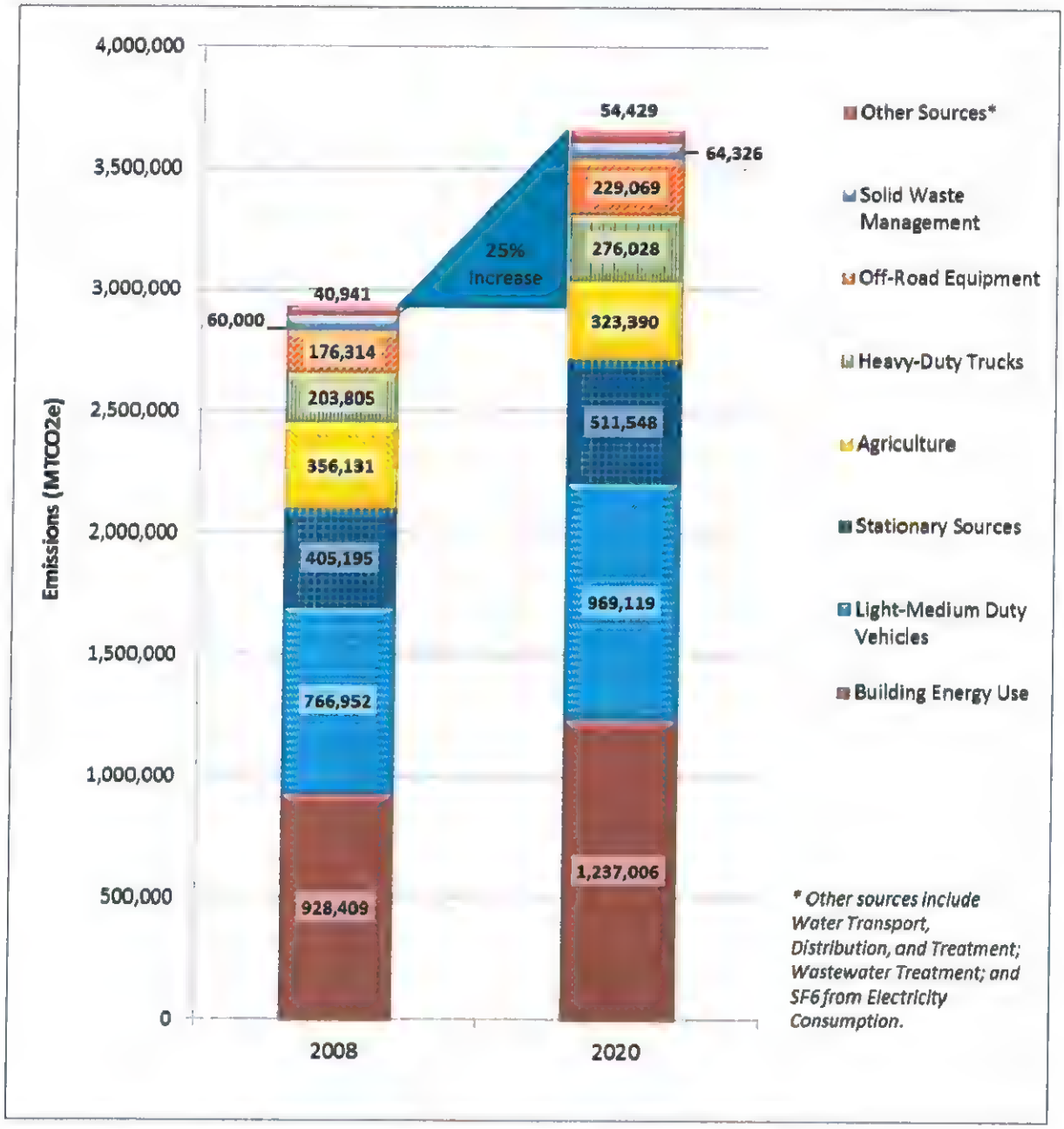


Figure 3. City of Ontario 2008 Community GHG Inventory and 2020 BAU Forecast – *Other Sources*

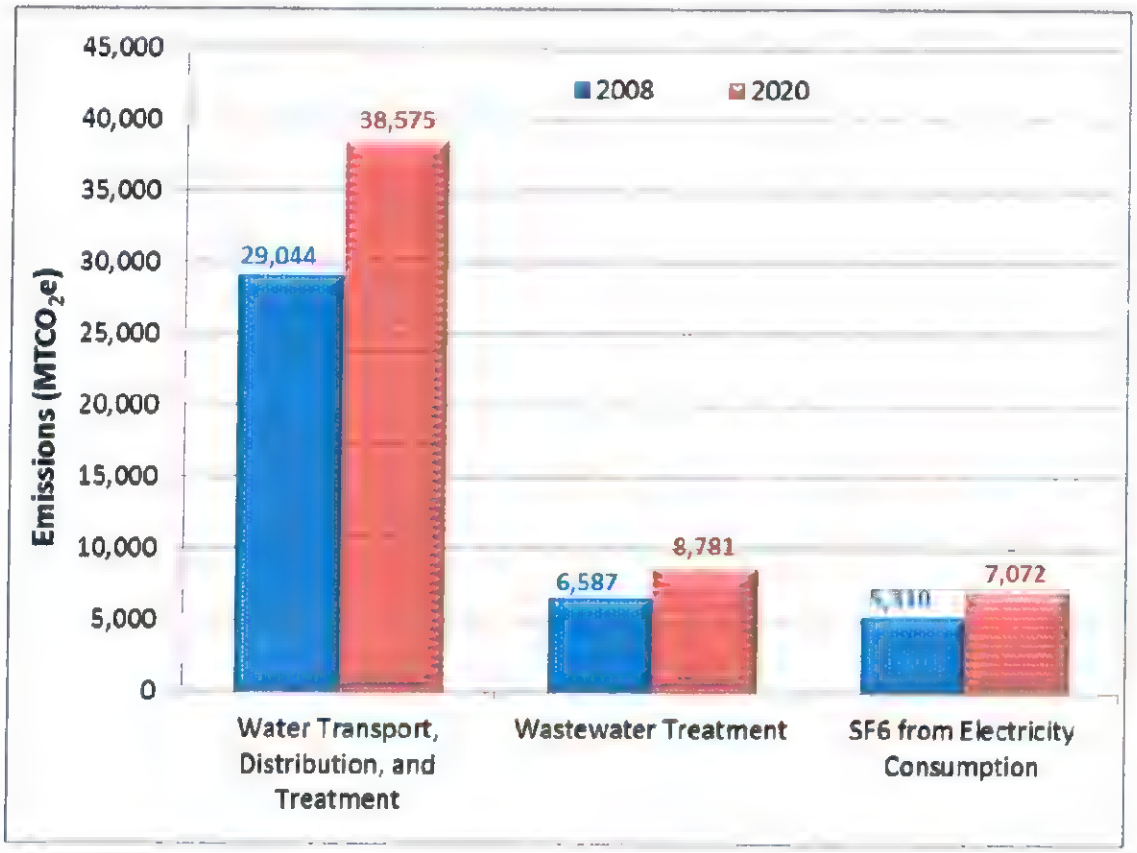


Table 1. City of Ontario 2008 Community GHG Inventory and 2020 BAU Forecast by Sector

Scope and Sector[1]	Description of Sector	2008 Inventory Emissions ($MTCO_2e$)	2008 Inventory Percent	2020 BAU Forecast Emissions ($MTCO_2e$)	2020 BAU Forecast Percent	Percent Increase from 2008 to 2020
Scope 1 Emissions	**Direct Emissions**					
Residential natural gas	Natural gas combustion	95,327	3.2%	130,539	3.6%	36.9%
Commercial/industrial natural gas	Natural gas combustion	368,456	12.5%	487,494	13.3%	32.3%
Stationary sources	Other fuels and processes	405,195	13.8%	511,548	14.0%	26.2%
Light and medium-duty vehicles	Vehicle fuel combustion	766,952	26.1%	969,119	26.4%	26.4%
Heavy-duty vehicles	Vehicle fuel combustion	203,805	6.9%	276,028	7.5%	35.4%
Off-road equipment	Off-road equipment	176,314	6.0%	229,069	6.3%	29.9%
Agriculture	Livestock and fertilizer	356,131	12.1%	323,390	8.8%	-9.2%
Subtotal Scope 1		**2,372,180**	80.7%	**2,927,188**	79.9%	15.3%
Scope 2 Emissions	**Indirect Emissions**					
Residential electricity	Electricity use	91,231	3.1%	124,930	3.4%	36.9%
Commercial/industrial electricity	Electricity use	373,395	12.7%	494,042	13.5%	32.3%
Solid waste management	Solid waste decomposition	60,000	2.0%	64,326	1.8%	7.2%
Wastewater treatment	Liquid waste treatment	6,587	0.2%	8,781	0.2%	33.3%
Water transport, distribution, and treatment	Electricity for water supply	29,044	1.0%	38,575	1.1%	32.8%
SF_6 from electricity consumption	Electrical transformers	5,310	0.2%	7,072	0.2%	33.2%
Subtotal Scope 2		**565,568**	19.3%	**737,727**	20.1%	30.4%
Total Scopes 1 and 2		**2,937,747**	100%	**3,664,915**	100%	24.8%

[1] Refer to Section 3.1, *Inventory Protocols* for a detailed discussion of scopes.

BAU = business as usual.

SF_6 = sulfur hexafluoride.

1.3 Inventory Limitations and Recommendations

This inventory serves as a baseline for emission reduction measures and as a starting point for future GHG emissions inventories. Future updates to the GHG emissions inventory presented in this report will be conducted every 3 years. Frequent inventory updates ensure that the inventory remains accurate and that data gaps are resolved in a timely manner, and enable efficient tracking of the effectiveness of any GHG reduction measures put in place to address these emission sources.

Although considerable efforts were made to obtain activity data from 2008, the inventory base year, in some cases these data were unavailable and data from another year were substituted (e.g., stationary source data for 2007 were scaled to 2008). Changes in emissions or activity from one year to the next are expected to be relatively minor, so any substitution in data will have a small effect on the inventory. In addition, data obtained for certain sectors were provided in an aggregated format. For example, building energy use data provided by the major utilities supplying electricity and natural gas to the City were aggregated by general sector (residential or commercial plus industrial) instead of by specific activity or entity. Commercial and industrial data had to be

aggregated into one group to avoid confidentiality conflicts with large electricity users in the City. A greater level of detail and disaggregation would strengthen this inventory and greatly increase the potential for the City to identify, quantify, and monitor effective emission reduction actions. Specific data gaps and limitations are identified and discussed on a sector-by-sector basis below.

1.3.1 2020 Business as Usual Projection Limitations

Where possible, 2020 BAU projections were made using the best available information and estimates provided by City staff and experts on individual sectors. For many sectors (e.g., residential fuel combustion), projections were based on the future population estimate for the City using data provided by the Southern California Association of Governments (SCAG). This method assumes that emissions will remain proportionate to the current population, which may not be completely accurate. For example, per capita energy consumption may change over time as habits and technology change. For some sectors, especially where emissions are tied to infrastructure (e.g., stationary sources, agriculture) rather than population, estimates were made based on an anticipated maximum or buildout of infrastructure. It is possible that the ratio of certain emission sources (e.g., natural gas combustion in commercial buildings) to a quantity of infrastructure (e.g., commercial square feet) may change over time.

2. Introduction

The temperature on Earth is regulated by a system commonly known as the *greenhouse effect*. Greenhouse gases (GHGs) in the atmosphere absorb heat radiated from the earth's surface and reradiate that heat in all directions, including back to the surface. Without these gases, heat would escape the atmosphere and the temperature of the earth's surface would be much cooler. However, with too much of these gases, the amount of heat returning to the surface would continue to increase, leading to large-scale climatic changes. According to the U.S. Environmental Protection Agency (EPA), a GHG is any gas that absorbs infrared radiation in the atmosphere. Specifically, the following six GHGs are defined in Assembly Bill (AB) 32 and the California Environmental Quality Act (CEQA) guideline amendments: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).

Once emitted, GHGs remain in the atmosphere for decades or centuries and therefore can mix globally. Innumerable direct and indirect sources, both natural and anthropogenic, cause increased atmospheric concentrations of GHGs. The most common natural sources of GHGs include decomposition of organic matter and wildfires. Many human activities add to the levels of naturally occurring gases. When solid waste, fossil fuels (oil, natural gas, and coal), and wood and wood products are burned, CO_2 is released to the atmosphere. Agricultural cultivation, industrial activities, and solid waste or fossil fuel combustion emit N_2O. CO_2 and N_2O are the two GHGs released in the greatest quantities from burning gasoline and diesel fuel in vehicles (mobile sources). CH_4, a highly potent GHG, results from off-gassing associated with agricultural practices and landfills, among other sources. The synthetic chemicals that form HFCs and PFCs are used to replace the ozone-depleting substances that are being phased out under the Montreal Protocol on Substances That Deplete the Ozone Layer (1987), an international agreement designed to protect the stratospheric ozone layer originally signed in 1987. Electric transmission and distribution systems emit SF_6, as do various industrial manufacturing processes.

As global, national, and state populations and economies have grown, anthropogenic emissions of GHGs have continued to increase. This increase is due primarily to the burning of fossil fuels for heating, cooking, and other consumer uses. The associated increases in atmospheric concentrations of GHGs are expected to cause a variety of adverse environmental impacts related to large-scale changes in the climate system. Climate change impacts of greatest concern for the state of California are sea-level rise, increased frequency and intensity of wildfires, decreased Sierra Nevada snowpack and associated consequences to water supply, changes in winter precipitation patterns and associated consequences to water supply, increased frequency and intensity of extreme heat events, and degradation in regional air quality as a result of warmer temperatures (California Energy Commission 2009; California Natural Resources Agency 2009).

2.1 Inventory Background

The City of Ontario (City) has committed to an in-depth review of emissions associated with activities in the community. The results of the community inventory for 2008 are presented in this report and define a baseline from which future emissions under business as usual (BAU) conditions can be projected. The 2020 emissions projection represents the BAU forecast and is based on anticipated growth in the City, specific to each inventory sector. The 2008 inventory is based on actual 2008 activity data and emission factors and includes all significant contributing sectors to GHG emissions, according to the guidelines of the California Air Resources Board

(CARB) Local Governments Operations Protocol (2010c), as stated below in Section 3.2, *Emission Factors*. This inventory was developed with detail sufficient to support identification of GHG reduction measures specific to the City's community emissions.

A BAU projection of community emissions was developed for the year 2020. This projection can be used to determine the magnitude of the reductions that need to be achieved by 2020 (relative to current emissions) to reach a particular emissions target. The BAU projections are based on current energy consumption and anticipated growth rates provided by the City, the Southern California Association of Governments (SCAG), CARB, the California Department of Finance, and other appropriate data sources as listed in this report. The BAU projections do not assume the implementation of any federal, state, or local reduction measures but project the future emissions based on current energy and carbon intensity in the existing economy, consistent with CARB's analysis conducted for AB 32. The specific assumptions associated with the sector growth rates are provided in Table 2 below.

In January 2010, the City approved The Ontario Plan, which provides a framework for the future community of Ontario (City of Ontario 2010). The Ontario Plan incorporates many policies and measures to improve the City's sustainability and reduce GHG emissions from City activities. The City also prepared a Draft Environmental Impact Report (DEIR) to evaluate the potential for implementation of The Ontario Plan to affect or be affected by global climate change (City of Ontario 2009). The DEIR provides a comprehensive comparative analysis of the measures published by the California Air Pollution Control Officer's Association (CAPCOA) and the Attorney General to the policies contained in The Ontario Plan and mitigation measures incorporated into the DEIR. The Ontario Plan and the DEIR provide a comprehensive foundation for climate action planning in the City. This inventory aims to strengthen this foundation by providing a framework for the City's Climate Action Plan (CAP) subsequent to The Ontario Plan.

As part of The Ontario Plan and the DEIR, the City conducted a community inventory for the year 2006. The 2008 inventory provides additional refinements to the 2006 inventory in various ways. The key differences and refinements are discussed briefly in Table 2. Table 3 presents a comparison of emissions from each sector of the inventories, including percent changes. Major differences between the two inventories occur in the building energy sector (the 2006 inventory used electricity use factors instead of actual utility data), the stationary source sector (the 2006 inventory did not include these emissions), the off-road equipment sector (the 2006 inventory did not include these emissions), and the on-road transportation sector, including light- and medium-duty vehicles and heavy-duty vehicles (the 2006 inventory used an older model with different trip apportionment methodology).

Table 2. Methodology Comparison of the 2006 and 2008 Community Inventories for the City of Ontario

Sector	2006 Inventory Method	2008 Inventory Method	Main Improvement
Building electricity (residential, commercial, and industrial)	Electricity usage factors and emission rates from the U.S. Energy Information Administration	Actual electricity consumption from the utilities, and utility-specific emission factors	Utility data and emission factors
Building natural gas (residential, commercial, and industrial)[1]	URBEMIS[2] average natural gas usage rates and emission factors	Actual natural gas consumption from the utilities, and California Climate Registry emission factors	Utility data
Stationary sources	N/A	South Coast Air Quality Management District 2007 Inventory	New sector
Light- and medium-duty vehicles	SCAG 2006 RTP Model; all trips, including those with trip starts and ends outside of the City, are included (not consistent with methods described by the SB 375 RTAC)	Draft 2012 RTP on-road modeling from SCAG; travel data and VMT associated with TAZ zones, incorporating origin-destination information (consistent with methodology described by the SB 375 RTAC)	New Model and RTAC methodology
Heavy-duty trucks	Same as light- and medium-duty vehicles	Same as light- and medium-duty vehicles	New sector
Off-road equipment	N/A	OFFROAD2007 model	New sector
Agriculture	Dairy cattle operations in the NMC from an estimate of existing livestock in the City	Livestock counts for cattle and dairy cows, provided for the City. Swine counts for the County, apportioned using farmland data for Ontario. Also includes N_2O emissions from fertilizer.	Additional livestock and fertilizer
Solid waste management	Projected waste disposal and EPA's Waste Reduction Model (WARM)	Projected waste disposal and CARB's FOD Model	Regional model
Wastewater treatment	N/A	Inland Empire Utilities Data and CARB emission factors	New sector
Water transport, distribution, and treatment	Projected water demand and southern California energy-intensity factors from the 2005 California Energy Commission report *California's Water-Energy Relationship* (WER) (12,700 kWh/MG)	Projected water demand and southern California energy-intensity factors from the 2006 California Energy Commission report *Refining Estimates of Water-Related Energy Use In California* (WER) (13,022 kWh/MG)	Updated energy-intensity factors
SF_6 from electricity consumption	N/A	CARB emission factors and utility data for electricity consumption	New sector

Source: City of Ontario 2009.

[1] Called *Area Sources* in the 2006 inventory.

[2] URBEMIS is a computer program that can be used to estimate emissions associated with land development projects in California such as residential neighborhoods, shopping centers, and office buildings; area sources such as gas appliances, wood stoves, fireplaces, and landscape maintenance equipment; and construction projects. URBEMIS stands for *Urban Emissions Model*.

CARB = California Air Resources Board.
EPA = U.S. Environmental Protection Agency.
FOD = First-Order Decay model.
kWh/MG = kilowatt hours per million gallons.
N_2O = nitrous oxide.
NMC = New Model Colony
RTAC = Regional Target Advisory Committee.
RTP = Regional Transportation Permit.
SB = Senate Bill.
SCAG = Southern California Association of Governments
TAZ = Traffic Analysis Zone
VMT = vehicle miles traveled.

Table 3. Emissions Comparison of the 2006 and 2008 Community Inventories for the City of Ontario

Scope and Sector	2006	2008	Percent Change
Scope 1 Emissions			
Electricity	855,221	464,626	-45.7%[1]
Natural gas	207,533	463,783	123.5%[1]
Stationary sources	0[2]	405,195	N/A
On-road transportation	2,522,251	970,757	-61.5%[3]
Off-road equipment	0[2]	176,314	N/A
Agriculture	356,533	356,131	0.1%
Subtotal Scope 1	**3,941,538**	**2,836,806**	**-28.03%**
Scope 2 Emissions			
Solid waste management	56,298	60,000	6.6%
Wastewater treatment	0[2]	6,587	N/A
Water conveyance	50,394	29,044	-42.4%[4]
Sf_6 from electricity consumption	0[2]	5,310	N/A
Subtotal Scope 2	**106,692**	**100,942**	**-5.39%**
Total Scope 1 and 2	**4,048,230**	**2,937,747**	**-27.43%**

[1] The large change is because the 2006 inventory used average energy usage factors and emission rates, while the 2008 inventory used actual energy consumption data from the utilities.

[2] The 2006 inventory did not include emissions from these sources.

[3] The large change is because the 2006 inventory incorporated vehicles trips with starts and ends outside the City, while the 2008 inventory includes 100% of trips that begin and end within the City and 50% of trips that begin in the City and end outside the City, and 50% of trips that end in the City and begin outside the City.

[4] The change is due to updated methodology for calculating water emissions.

2.1.1 Purpose of the Inventory

The purpose of the inventory is threefold. First, the 2008 inventory allows for a projection of BAU emissions for 2020 to identify the total reductions necessary to achieve AB 32 and Senate Bill (SB) 375 goals, as well as the City's more stringent goal of reducing GHG emissions from community activities by at least 30% by 2020. Second, City officials will be able to identify the major contributing sectors or emissions categories of the City's community emissions. Third, candidate measures for reducing emissions can be determined and will be used for the development of the community CAP.

2.2 City of Ontario Background

The City of Ontario covers more than 50 square miles and is home to the Ontario International Airport[6] and the Ontario Mills Mall, southern California's largest outlet shopping mall, entertainment center, and one of its largest tourist attractions. The City is the fourth most populous in San Bernardino County (County), behind the cities of San Bernardino, Fontana, and Rancho Cucamonga. The County itself is home to 24 incorporated cities and is the fifth most populous county in California. As of January 1, 2011, the California Department of Finance estimated the population of Ontario at 165,392 (California Department of Finance 2011). In 2008 (the baseline year for the inventories), the City's total population was 162,871 (Southern California Association of Governments 2012). The City is anticipated to grow dramatically from 2008 to 2020, increasing housing by 37%, retail jobs by 23%, and nonretail jobs by 44% (Southern California Association of Governments 2010). These growth rates account for the current economic recession.

This report describes the data sources and methods used to calculate community GHG emissions for the City as well as the actual emissions inventory. The boundaries of the inventory are defined as geographic (i.e., jurisdictional or city limits). Emissions for a particular source were included in the City's inventory if either the source of emissions occurs within the geographic boundaries of the City, or the emissions are a result of the City's community activity but occur outside of the City's geographic boundary (such as emissions occurring at distant power plants as a result of residential electricity consumption in the City).

[6] The Ontario International Airport was not included in the inventory because Ontario and its community have little to no jurisdiction over operations at the airport.

3. Methodology

This section presents the methodology used to prepare the GHG emissions inventory for the year 2008. This section discusses the inventory protocols, emission factors, inventory boundaries, and analysis methods.

3.1 Inventory Protocols

A number of widely accepted protocols for estimating GHG emissions were used to prepare the community inventory. The protocols used in the development of this inventory include those following.

- **California Air Resources Board Local Governments Operations Protocol** (2010c). This protocol is the standard for estimating emissions resulting from government buildings and facilities, government fleet vehicles, wastewater treatment and potable water treatment facilities, landfill and composting facilities, and other operations.
- **California Climate Action Registry and General Reporting Protocol** (2009a). This protocol provides guidance for preparing GHG inventories in California.
- **California Air Resources Board Greenhouse Gas Inventory Data 1990–2006** (2010a). This documentation provides background methodology, activity data, protocols, and calculations used for California's statewide inventory.
- **California Energy Commission Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004** (2006a). This inventory provides methodology and emission factors for statewide GHG emissions inventorying.
- **U.S. Environmental Protection Agency Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2008** (2010a). This inventory provides methodology and emission factors for nationwide GHG emissions inventories, which are applied in absence of state or local methodology.
- **Intergovernmental Panel on Climate Change Guidelines for National Greenhouse Gas Inventories** (2006a). This document is the international standard for inventories and provides much of the baseline methodology used in the national and statewide emission inventories.

The Local Governments Operations Protocol categorizes local government emission sources as Scope 1 (direct), Scope 2 (indirect), and Scope 3 (other indirect). The protocol defines these emissions as follows (California Air Resources Board 2010a).

- **Scope 1:** All direct GHG emissions (with the exception of direct CO_2 emissions from biogenic sources).
- **Scope 2:** Indirect GHG emissions associated with the consumption of purchased or acquired electricity, steam, heating, or cooling.
- **Scope 3:** All other indirect emissions not covered in Scope 2 that are not under the control or influence of the local government, such as the emissions resulting from the extraction and production of purchased materials and fuels, and transport-related activities in vehicles not owned or controlled by the reporting entity.

Scope 1 and 2 emissions were quantified and included in the community inventory. For example, direct emissions associated with on-site natural gas use are included in Scope 1 because these emissions occur within the City and are subject to the community's influence or control. Indirect GHG emissions associated with electricity use are included in Scope 2 because these emissions can occur outside the City but are subject to the community's influence or control. Inclusion of Scope 3 emissions in the inventory is optional, and the City elected not to include them.

3.2 Emission Factors

Emission factors and references are summarized in Table 4. These emission factors were used to calculate GHG emissions from activity data, such as kilowatt-hours (kWh) of electricity consumed for lighting or gallons of gasoline fuel combusted for light- and medium-duty vehicle transportation.

Table 4. Greenhouse Gas Emission Factors

Source	Emission Factor	Reference
Energy and Stationary Fuels		
Electricity[1]	0.28617 kg CO_2/kWh[2]	CCAR 2009b (2007 data)
	0.309 kg CO_2/kWh[3]	EPA 2010b (2007 data)
	0.000013 kg CH_4/kWh	EPA 2010b (2007 data)
	0.000003 kg N_2O/kWh	EPA 2010b (2007 data)
Natural Gas[4]	53.3 kg CO_2/GJ	IPCC 2006a
	0.005 kg CH_4/GJ	IPCC 2006a
	0.0001 kg N_2O/GJ	IPCC 2006a
Vehicle Fuels		
Diesel[5]	10.15 kg CO_2/US gallon	CCAR 2009a
	0.00015 kg CH_4/US gallon	IPCC 2006a
	0.00015 kg N_2O/US gallon	IPCC 2006a
Gasoline[5]	8.78 kg CO_2/US gallon	CCAR 2009a
	0.00013 kg CH_4/US gallon	IPCC 2006a
	0.0002 kg N_2O/US gallon	IPCC 2006a
Propane[5]	5.79 kg CO_2/US gallon	CCAR 2009a
	0.000992 kg CH_4/US gallon	CCAR 2009a; NAFA 2010
	0.002631 kg N_2O/US gallon	CCAR 2009a; NAFA 2010
Compressed natural gas (CNG)[6]	1.906992 kg CO_2/m^3	IPCC 2006a
	0.011127 kg CH_4/m^3	IPCC 2006a
	0.00099kg N_2O/m^3	IPCC 2006a
Ethanol[5]	1.329026 kg CO_2/US gallon	EIA 2010
	0.000782 kg CH_4/US gallon	EPA 2010c; Cal EPA 2009
	0.000952 kg N_2O/US gallon	EPA 2010c; Cal EPA 2009
Water-Related Electricity Intensities for Southern California[7]		
Water supply and conveyance	9,727 kWh/MG	CEC 2006b
Water treatment	111 kWh/MG	CEC 2006b
Water distribution	1,272 kWh/MG	CEC 2006b

Source	Emission Factor	Reference

[1] Emission factors are presented in is kilograms (kg) of each GHG per kilowatt hour (kWh) of electricity.
[2] Emission factor applies to electricity delivered to Southern California Edison (SCE) customers.
[3] Emission factor applies to electricity delivered to all other utility customers.
[4] Emission factors are presented in is kilograms (kg) of each GHG per gigajoule (GJ) of natural gas.
[5] Emission factors are presented in is kilograms (kg) of each GHG per U.S. gallon of fuel.
[6] Emission factors are presented in is kilograms (kg) of each GHG per cubic meter (m^3) of CNG.
[7] Electricity intensities are presented in kilowatt hours (kWh) of electricity per million gallons (MG) of water.

Cal-EPA = California Environmental Protection Agency
CCAR = California Climate Action Registry.
CEC = California Energy Commission.
EIA = Energy Information Administration.
EPA = U.S. Environmental Protection Agency.
GJ = gigajoule.
IPCC = Intergovernmental Panel on Climate Change.
kg = kilogram
kWh = kilowatt hours
m^3 = cubic meters.
MG = million gallons
NAFA = National Association of Fleet Administrators.

3.3 Analysis Methods

The following emissions sectors are included in the inventory. These include the emissions sectors as identified by AB 32 in the Executive Summary above, as well as additional subsectors (e.g., residential is a subsector of building energy). The data source for each emission sector also is listed.

- **Residential—Scopes 1 and 2:** Natural gas and electricity consumption for the residential sector. Data provided by utilities.
- **Commercial/Industrial—Scopes 1 and 2:** Natural gas and electricity consumption for the commercial and industrial sector combined. Data provided by utilities.
- **Stationary Sources—Scope 1:** Fuel combustion, industrial process emissions etc. Data provided by the South Coast Air Quality Management District (SCAQMD) County-wide inventory for 2007 and 2020 and by CARB.
- **Light- and Medium-Duty Vehicles—Scope 1:** Fuel consumption for light- and medium-duty vehicles in the City. VMT data provided by SCAG and supplemented with vehicle data from CARB's EMFAC model.
- **Heavy-Duty Vehicles—Scope 1:** Fuel consumption for heavy-duty vehicles in the City. VMT data provided by SCAG and supplemented with vehicle data from CARB's EMFAC model.
- **Off-Road Equipment—Scope 1:** Fuel consumption for off-road vehicles and equipment in City. Data provided by the OFFROAD model.
- **Agriculture—Scope 1:** Enteric fermentation and manure management from agricultural operations as well as N_2O emissions from fertilizer application. Data provided by the Regional Water Quality Control Board, Santa Ana Region, and the Department of Food and Agriculture's Production Statistics.
- **Solid Waste Management—Scope 2:** CH_4 emissions from waste generated by the community and deposited in landfills. Data provided by CalRecycle.
- **Wastewater Treatment—Scope 2:** Fugitive emissions from domestic wastewater treatment. Data provided by the Inland Empire Utilities Agency (IEUA) and CARB.

- **Water Transport, Distribution, and Treatment—Scope 2:** Electricity consumption associated with water importation. Data provided by the Ontario 2005 Urban Water Management Plan and the California Energy Commission (CEC).
- **SF_6 from Electricity Consumption—Scope 2:** fugitive emissions of SF_6 from the transport of electricity to the City. Data provided by utilities and CARB.

The inventory was conducted primarily using ICF's proprietary Greenhouse Gas Inventory Database (GHG:ID) tool and supplemented with additional emissions calculations. The GHG:ID tool conforms to widely accepted protocol and provides a robust platform for emissions evaluation.

Table 5 presents the emissions sectors included in the community inventory; the data source for each emission sector; details on the methodology for scaling emissions to the City from County- or state-wide resources, as appropriate; and the methodology for projecting emissions to 2020. Population, housing, and employment data for both 2008 and 2020 are presented in Table 6.

Table 5. Community Inventory Data Sources and Methodology

Sector	Emission Sources	Source of Data (Data Level)	Scaling Methodology to City Level	Projection Methodology	Growth Factor
Stationary sources	Fuel combustion Industrial process emissions	SCAQMD (County-wide data)	City population and employment	Population and employment growth forecasts[1]	1.26
Residential	Electricity consumption Natural gas consumption Other fuel consumption by type (natural gas, liquefied petroleum gas, fuel oil, diesel, gasoline, etc.)	Electricity records from utilities (City-level data)[2] Gas records from utilities (City-level data)[3]	None	Growth in households	1.37
Commercial/industrial	Electricity consumption Natural gas consumption Other fuel consumption by type (natural gas, liquefied petroleum gas, fuel oil, diesel, gasoline, etc.)	Electricity records from utilities (City-level data)[2] Gas records from utilities (City-level data)[3]	None	Growth in total employment	1.32
Light- and medium-duty Vehicles	Fuel combustion in light- and medium-duty on-road vehicles	SCAG Draft 2012 RTP modeling	None	SCAG Draft 2012 RTP forecast	1.26
Heavy-duty vehicles	Fuel combustion heavy-duty vehicles	SCAG Draft 2012 RTP modeling		SCAG Draft 2012 RTP forecast	1.35
Off-road equipment	Off-road equipment fuel combustion	OFFROAD2008 (County-level data)	City population and employment	Population and employment growth forecasts[1]	1.30
Agricultural emissions	Enteric fermentation, manure management, and fertilizer application	Regional Water Quality Control Board livestock counts (City-level data) Department of Food and Agriculture's Production Statistics (County-level data)	Quantity of dairy, cattle, and swine; grazing land use	Linear projection of farmland acreage from 2008 to 2050.	0.91

Sector	Emission Sources	Source of Data (Data Level)	Scaling Methodology to City Level	Projection Methodology	Growth Factor
Solid waste management	Methane emissions from landfilled waste	City SWMD (City-level data) CalRecycle (City-level data) EPA Landfill Methane Outreach Program (LMOP) database (statewide data) CARB Landfill Emissions Report (statewide data)	None	Related to growth in population[4]	1.07
Domestic wastewater treatment and discharge	CH_4 and N_2O emissions from the treatment of wastewater from domestic sources (municipal sewage)	Inland Empire Utilities Agency (County-level data)	City population	Population forecast	1.33
Water transport, distribution, and treatment	Indirect electricity emissions for water supply, treatment, distribution, and wastewater treatment	California Energy Commission, Urban Water Management Plan (City-level data)	None	Urban Water Management Plan forecast	1.33
SF_6 from electricity consumption	Fugitive emissions of SF_6 from the transport of electricity to the City	Electricity records from utilities (City-level data)[2] California Energy Commission, Urban Water Management Plan (City-level data)	None	Varies based on source of electricity CARB emission factors	1.33

[1] Specific growth forecasts are based on individual emission sources within these sectors (e.g., for off-road, residential equipment emissions were projected based on population, while industrial equipment emissions were based on non-retail employment).

[2] The City's electric utility is Southern California Edison (SCE).

[3] The City's natural gas utility is Southern California Gas Company (SCG).

[4] Solid waste emissions are based on past waste generated by the City of Ontario, so the 2020 forecast accounts for past population growth in the City. See Section 4.7 for more detail.

Table 6. City of Ontario Population, Housing, and Employment Estimates and Forecasts

Category	2008	2020	Growth Factor
Population	162,871	215,765	1.32
Households	44,639	61,128	1.37
Single-Family Households	*26,395*	*36,026*	*1.36*
Multi-Family Households	*18,244*	*25,102*	*1.38*
Employment *(jobs)*	114,339	151,279	1.32
Retail Employment	*34,529*	*42,602*	*1.23*
Nonretail Employment	*79,810*	*108,677*	*1.36*

Growth projections were provided by SCAG and modified by the City of Ontario.

Growth factors for 2008 through 2020 were calculated as the ratio of 2020 projections to year 2008 estimates. The 2008 emissions were multiplied by those growth factors to project 2020 emissions, as indicated in Table 5 and Table 6 above.

4. Inventory Results

This section presents the 2008 Community Greenhouse Gas Emissions Inventory, including the data collection and calculation methodology for each sector. The results of the community inventory for 2008 in MT of CO_2e are presented in Table 1 and Figures 1, 2, and 3. Each section below describes a different sector of the inventory. Introductory information for each sector is followed by data acquisition and sources, emission calculations and methodologies, data gaps, and emissions.

4.1 Building Energy Use

Building energy use from residential, commercial, and industrial buildings is a significant component of the community GHG inventory, accounting for 31.6% of the total regional emissions in 2008. Energy consumption includes electricity and natural gas usage. Electricity use can result in indirect emissions from the power plants that produce electricity outside of City boundaries; these are classified as Scope 2 emissions. Natural gas consumption results in direct emissions where the natural gas is combusted; these are classified as Scope 1 emissions.

4.1.1 Data Acquisition and Sources

The City obtains electricity from Southern California Edison (SCE). Electricity data were obtained from utility bills and aggregated into two major categories: residential and commercial/industrial. Commercial and industrial data had to be aggregated into one group to avoid confidentiality conflicts with large electricity users in the City.

Natural gas is supplied to the City by the Southern California Gas Company (SCG). SCG provided natural gas consumption data for single-family residences, multi-family residences, and commercial/industrial buildings. Similar to the electricity data, commercial and industrial consumption had to be grouped together to avoid confidentiality conflicts.

4.1.2 Emissions Calculations and Methodologies

Electricity and natural gas consumption quantities were multiplied by the emission factors presented in Table 2 to determine GHG emissions for 2008. Utility-specific emission factors were used to calculate emissions from electricity consumption for SCE (California Climate Action Registry 2009b). These factors represent all emissions related to electricity deliveries in 2007, including owned and purchased power.[7]

2020 BAU GHG emissions from natural gas and electricity consumption were estimated using City growth forecasts presented in Tables 5 and 6. For the residential sector, emissions were projected using the growth in

[7] The emission factor was only available for 2007 but was applied to the energy consumption in 2008. Also, the emission factor varies from year to year because of a variety of factors that influence a utility's ratio of owned to purchased power and the source of generation (natural gas, hydroelectric, coal, etc.). The emission factor is higher in years when a utility purchases more power to meet California electricity demand. Thus, the emission factor for any given year can vary and also varies widely by utility company (California Climate Action Registry 2009b).

households. For the commercial/industrial sector, emissions were projected using the growth in total employment.

4.1.3 Data Gaps

Commercial and industrial energy use data were grouped to avoid confidentiality conflicts. While disaggregation of these data would not change the overall City-wide inventory, it would help refine the inventory and aid in the CAP planning process. In addition, emission factors for electricity delivered by SCE for the year 2007 were used to calculate emissions for electricity consumed in 2008, because 2008 emission factors were not available.

4.1.4 Building Energy Use Emissions

Table 7 presents the 2008 and 2020 BAU emissions inventory for building energy use in the City of Ontario.

Table 7. 2008 and 2020 Business as Usual Forecast of Building Energy Use and Greenhouse Gas Emissions

	2008 Inventory			2020 BAU Forecast		
Sector	kWh	Therms	MT CO_2e	kWh	Therms	MT CO_2e
Residential	317,534,340	16,908,445	186,558	434,826,926	23,154,180	255,470
Commercial/Industrial	1,299,620,450	65,354,314	741,851	1,719,539,371	86,468,618	981,537
Total	**1,617,154,790**	**82,262,759**	**928,409**	**2,154,366,297**	**109,622,797**	**1,237,006**

4.2 Light- and Medium-Duty Vehicles

Light- and medium-duty vehicle emissions accounted for approximately 26.1% of the City's total community emissions in 2008. These emissions were direct Scope 1 emissions resulting from the vehicle fuel combustion.

This source includes emissions from on-road light- and medium-duty vehicles associated with activity within Ontario (i.e., trips that neither begin nor terminate within Ontario City limits are omitted from the inventory). Trips that have an origin, destination, or both within Ontario are counted. Emissions originate from the combustion of fossil fuels (such as diesel, gasoline, compressed natural gas, etc.) to power light- and medium-duty vehicles. These emissions are direct Scope 1 emissions and accounted for approximately 26.1% of the City's total emissions in 2008.

4.2.1 Data Acquisition and Sources

Data on trips and vehicle miles traveled (VMT) were obtained at the city level on an origin-destination basis from SCAG's 2012 regional travel demand[8] model for the years 2008 and 2020. The data were obtained for light- and medium-duty vehicles, which are defined by SCAG as all passenger cars, pick-up and single unit trucks, and recreational vehicles.

[8] Description and documentation for SCAG's 2012 model are available here: www.scag.ca.gov/modeling.

The 2008 data were based on the transportation network existing in 2008 and socioeconomic data (population and employment) for that year. The 2020 plan scenario was based on growth forecasts received from local jurisdictions and the planned network in that year. The VMT and trips data were obtained from SCAG for an average weekday and were multiplied by 347[9] to calculate the annual VMT. This is the factor used by SCAG to annualize the average weekday data.

For Ontario, SCAG provided VMT for trips that have an origin, destination, or both within the City. To allocate the VMT appropriately to the City, ICF used the methodology recommended by the SB 375 Regional Targets Advisory Committee (RTAC).[10] This methodology scales VMT to individual jurisdictions according to the following three accounting rules.

- VMT for vehicle trips that originate and terminate within the city are weighted by a factor of 1.
- VMT for vehicle trips that either originate or terminate (but not both) within the jurisdiction are weighted by a factor of 0.5.
- VMT for vehicle trips with neither originate nor terminate within the jurisdiction are weighted by a factor of 0. These trips are commonly called pass-through trips.

Essentially, ICF allocated to Ontario one half of the VMT for any trip with an origin or destination within the City. This method avoids apportioning through trips on freeways or major arterials to the cities containing them, while allocating emissions to the cities that can take responsibility for reducing them. The method was applied to both light- and medium-duty, and heavy-duty VMT.

In addition, at the county level, data on VMT by speed bin were obtained using a link-based analysis method based on traffic volumes on each link of the network, the distance traveled on each link, and speeds on each link in the County. If a link was split by the county boundary, a ratio was calculated by SCAG based on distance to determine the VMT falling within the County. The county-wide VMT by speed bin was used to estimate emissions for the City of Ontario.

4.2.2 Emissions Calculations and Methodologies

To quantify GHG emissions for 2008, ICF used the VMT and county-level average speed data from SCAG as inputs into CARB's EMFAC 2011 model to determine CO_2 emission factors for 2008 by speed bin and vehicle type for the South Coast Air Basin. Emission factors for CH_4 and N_2O were obtained from the 2012 Climate Registry. ICF weighted the emission factors by VMT (available in EMFAC) to obtain emission factors for the two required vehicle categories—light- and medium-duty vehicles, and heavy-duty vehicles. To calculate annual emissions, the VMT were multiplied by the appropriate emission factors for the City (by vehicle type) expressed in grams per mile.

A similar process was followed for the 2020 BAU analysis, using SCAG's VMT data from the 2020 Plan scenario and emission factors for that year.

[9] This number conforms to the methodology CARB uses in the Pavley I and LCFS policies. 347 days is used to account for the reduced vehicle activity on weekends as compared to weekdays. (California Air Resources Board 2010d)

[10] The origin/destination modeling methodology provides a better accounting of VMT associated with land use jurisdiction than approaches that apportion VMT on the basis of population shares or on the basis of VMT that occurs within the boundaries of a jurisdiction.

Finally, the resulting GHG emissions were calculated for the City, expressed in terms of annual MT CO_2e[11] generated by on-road vehicles, using the appropriate GWP data for CH_4 and N_2O.[12]

4.2.3 Data Gaps

The VMT by speed bin data available from SCAG was at the county level and was not available at the city level. It would take significant data processing effort from SCAG to make this available. Therefore, ICF used the proportion of the County's VMT in each speed bin to disaggregate each city's VMT by speed bin in order to apply the appropriate emission factors to calculate emissions. This method assumes that the City of Ontario hase a VMT by speed distribution that is the same as the overall County. Although the impact on the inventory is not likely to be significant, if city-level VMT were available by speed bin, it would lead to a more accurate inventory.

4.2.4 Light- and Medium-Duty Vehicles Emissions

Table 8 presents light- and medium-duty vehicle emissions.

Table 8. 2008 and 2020 Business as Usual Forecast Light- and Medium-Duty Vehicles Emissions

Category	2008 Inventory	2020 BAU Forecast
VMT	1,765,679,554	2,263,186,052
GHG Emissions ($MTCO_2e$)		
CO_2	750,532	961,861
CH_4	45	41
N_2O	50	21
Total Emissions ($MTCO_2e$)	**766,952**	**969,119**

4.3 Heavy-Duty Vehicles

Truck emissions accounted for approximately 6.9% of the City's total community emissions in 2008. These emissions were direct Scope 1 emissions resulting from the vehicle fuel combustion.

This source includes emissions from on-road heavy-duty vehicles associated with activity within Ontario (i.e., trips that neither begin nor terminate within Ontario City limits are omitted from that city's inventory). Trips that

[11] This is the international unit that combines the differing impacts of all GHGs into a single unit, by multiplying each emitted gas by its GWP.

[12] GWP compares the relative global warming effect of the GHG in question to CO_2 and is a measure of how much a given mass of GHG contributes to global warming. The GWP of CO_2 is, by definition, 1. The GWP values used in this report are based on the Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report (SAR) and United Nations Framework Convention on Climate Change (UNFCCC) reporting guidelines and are: CO_2 = 1, CH_4 = 21, N_2O = 310, SF_6 = 23,600 (Intergovernmental Panel on Climate Change 1996, United Nations Framework Convention on Climate Change 2006). Although the IPCC Fourth Assessment Report (AR4) presents different GWP estimates, the current inventory standard relies on SAR GWPs to comply with reporting standards and consistency with regional and national inventories (Intergovernmental Panel on Climate Change 2007; U.S. Environmental Protection Agency 2010a).

have an origin, destination, or both within Ontario are counted. Emissions originate from the combustion of fossil fuels (such as diesel, gasoline, compressed natural gas, etc.) to power light- and medium-duty vehicles. These emissions are direct Scope 1 emissions and accounted for approximately 6.9% of the City's total emissions in 2008.

4.3.1 Data Acquisition and Sources

Data on trips and VMT were obtained at the city level on an origin-destination basis from SCAG's 2012 regional travel demand[13] model for the years 2008 and 2020. The data were obtained for heavy-duty vehicles, which are defined by SCAG as trucks with gross vehicle weight greater than or equal to 8,500 pounds.

Aside from the definition of light-duty vehicles and because heavy-duty and light- and medium-duty vehicles have the same data sources, refer to Section 4.2.1 for additional explanation of data acquisition and sources for heavy-duty vehicles.

4.3.2 Emissions Calculations and Methodologies

Because the same methodologies and calculations are used for both heavy-duty and light- and medium-duty vehicles, refer to Section 4.2.2 for the discussion of the emissions calculations and methodologies for heavy-duty vehicles.

4.3.3 Data Gaps

Because heavy-duty and light- and medium-duty vehicles have the same data sources, refer to Section 4.2.3 for discussion of data gaps.

4.3.4 Heavy-Duty Vehicle Emissions

Table 9 presents heavy-duty vehicle emissions.

Table 9. 2008 and 2020 Business as Usual Forecast Heavy-Duty Vehicles Emissions

Category	2008 Inventory	2020 BAU Forecast
VMT	201,779,568	264,437,532
GHG Emissions ($MTCO_2e$)		
CO_2	201,988	274,789
CH_4	7	5
N_2O	5	4
Total Emissions ($MTCO_2e$)	**203,805**	**276,028**

[13] Description and documentation for SCAG's 2012 model are available here: <http://www.scag.ca.gov/modeling>.

4.4 Stationary Sources

This category includes emissions from fuel combustion (such as diesel, gasoline, and propane) and fugitive emissions of CH_4 and N_2O from industrial facilities in the City. Emissions from these sources accounted for approximately 13.8% of the total City emissions in 2008.

GHG emissions from stationary sources result from fuel use other than natural gas consumption, which is accounted for in the building energy category (Section 4.1). The following categories were included in this sector:

- oil and gas production (combustion)
- manufacturing and industry
- food and agricultural processing
- fuel combustion
- coatings and related processes
- cleaning and surface coatings
- petroleum production and marketing
- chemical production
- mineral processes
- industrial processes
- asphalt paving and roofing
- sewage treatment
- service and commercial (combustion)
- residential (combustion)
- and cooking

Emissions associated with electricity use were not included in this category as they were quantified as part of Ontario's commercial and industrial building energy emissions (Section 4.1).

4.4.1 Data Acquisition and Sources

County-wide GHG emissions for stationary sources were obtained from the 2007 SCAQMD inventory (South Coast Air Quality Management District 2007). Population and employment statistics provided by SCAQMD and SCAG were used to scale the 2007 inventory to 2008 and to apportion emissions to the City.

4.4.2 Emissions Calculations and Methodologies

The 2007 SCAQMD inventory includes emissions from natural gas combustion (Section 4.1). To avoid double counting, the percentage of emissions associated with natural gas consumption was subtracted from the SCAQMD total stationary source inventory. The resulting fuel combustion emissions therefore include only emissions associated with fuel use other than natural gas (e.g., propane, diesel, fuel oil).

Since the SCAQMD inventory represents emissions for the year 2007, it was necessary to scale these emissions by a growth factor to estimate emissions for the year 2008. To estimate stationary source emissions for 2008, all sectors within the 2007 SCAQMD inventory (except resident fuel combustion) were scaled by the change in County-wide employment from 2007 to 2008 (South Coast Air Quality Management District 2007). This metric was determined to be the most accurate for scaling nonresidential emissions because stationary fuel combustion likely trends with employment in the County. (Employment by specific economic sector was not available, so total employment was used.) Residential fuel combustion emissions in 2007 were scaled by the change in County-wide population because fuel combustion in the residential sector most likely trends with the number of

residents in the County. To determine emissions for the City, the calculated County-wide 2008 emissions were scaled by the respective ratios for City-wide employment and population, as provided by SCAG (2012).

2020 BAU GHG emissions were estimated by using City growth forecasts presented in Tables 5 and 6. All emissions except residential fuel combustion were projected using the growth in total employment. Residential fuel combustion was projected using the growth in population.

4.4.3 Data Gaps

Stationary source data were obtained from SCAQMD as discussed above. Because these data were for 2007, emissions were scaled by the change in population and employment from 2007 to 2008. These data then were apportioned to the City using City-wide population and employment statistics, as indicated in the table below. This approach is based on the assumption that stationary sources can be reasonably approximated with population and employment. This is not necessarily the case because various stationary source emissions may not be equally represented in the City based on population and employment. Moreover, the approach assumes a linear relationship between population and employment change from 2007 and 2008 and stationary source emissions.

To improve this analysis, stationary source data for 2008 specifically for Ontario should be obtained. This will require greater coordination between stationary source facilities, the City, and the SCAQMD, as well as better tracking systems for residential fuel combustion quantities.

4.4.4 Stationary Source Emissions

Table 10 presents the City-wide 2008 and 2020 BAU emissions from stationary sources, a brief definition of each source, and the metric used to scale County-wide emissions to the City. Stationary source emissions have been grouped into the following major source categories: industrial, commercial, sewage treatment, residential, agricultural, and miscellaneous.

Table 10. 2008 and 2020 Business as Usual Forecast Stationary Source Emissions

Sector	Description	Scaling Metric	2008 Inventory ($MTCO_2e$)	2020 BAU Forecast ($MTCO_2e$)
Industrial	Industrial fuel combustion[1]	Total employment	154,891	199,292
Commercial	Commercial fuel combustion[1]	Total employment	133,906	180,090
Waste	Diesel oil and digester gas [2]	Total employment	19,913	26,346
Residential	Residential fuel combustion[1]	Population	3,293	4,363
Agricultural	Farming operations and waste burning[3]	Total employment	92,836	100,987
Miscellaneous	Charbroiling emissions from cooking and other emission sources	Total employment	355	470
Total Emissions ($MTCO_2e$)			**405,195**	**511,548**

[1] Does not include natural gas combustion as these emissions are accounted for in the building energy sector (refer to Section 4.1)

[2] Includes emissions from stationary fuels combusted as part of the sewage treatment process. Please refer to the wastewater sector (Section 4.8) for a discussion of CH_4 and N_2O associated with the treatment and breakdown of waste.

[3] Represents combustion emissions from heavy-duty agricultural equipment (e.g., tractors) and the burning of agricultural waste. Refer to the agricultural sector (Section 4.6) for a discussion of emissions associated with livestock activity and the application of fertilizer.

4.5 Off-Road Equipment

Off-road equipment emissions accounted for approximately 6.0% of the total regional emissions in 2008. These emissions are direct Scope 1 emissions resulting from equipment fuel combustion. Off-road equipment includes recreational boats and vehicles and equipment for industry, construction, lawn and garden maintenance, military activities, and agriculture.

4.5.1 Data Acquisition and Sources

The CARB OFFROAD 2007 air quality model was used to calculate off-road equipment GHG emissions. Because the model provides County-level data, it was run for the year 2008 to calculate overall fuel consumption (gasoline, diesel, and liquefied petroleum gas) for off-road equipment in San Bernardino County. Equipment categories were refined to include those activities relevant to Ontario. The following equipment categories, as defined by the OFFROAD model, were included in the model run: recreational, construction and mining, industrial, lawn and garden, agricultural, transportation refrigeration units, entertainment, pleasure craft[14], and other portable equipment. Fuel consumption estimates by equipment type were apportioned by population and employment statistics to obtain emissions for Ontario.

4.5.2 Emissions Calculations and Methodologies

To obtain emissions for Ontario, City-wide population and employment by economic sector statistics were used to apportion the OFFROAD fuel combustion data. Table 11 outlines the scaling factors used in this analysis to

[14] There are no major bodies of water within City boundaries. However, it was assumed that residents in Ontario would travel to nearby bodies of water for recreation.

apportion the County-wide emissions to Ontario. The table also provides a rationale as to why these factors were selected to represent each equipment category. Once fuel consumption estimates were appropriated, the data were multiplied by fuel emission factors (see Table 4) to calculate CO_2, CH_4, and N_2O.

Table 11. Off-Road Equipment and Scaling Factors

Off-Road Equipment	Scaling Factor	Rationale
Recreational	Population	Equipment assumed to be owned by households
Construction and mining	Industrial employment	Equipment use assumed to be correlated with industrial employment and activity
Industrial	Industrial employment	Equipment use assumed to be correlated with industrial employment
Lawn and garden	Population	Equipment assumed to be owned by households
Light commercial	Retail and non-retail employment	Equipment use assumed to be correlated with general commercial activity
Agricultural	Agriculture employment	Equipment use assumed to occur on agricultural fields
Transport refrigeration units	Total employment	Equipment use could not be appropriately matched with a specific employment sector and therefore was assumed to correlate with total employment
Entertainment	Population	Equipment assumed to be owned by households
Pleasure craft	Population	Equipment assumed to be owned by households
Other portable equipment	Total employment	Equipment could not be appropriately matched with a specific employment sector and therefore was assumed to correlate with total employment

Fuel combustion associated with railyard and airport ground equipment was not included in this inventory because the City and its community have little to no jurisdiction over these activities. Oil drilling equipment was not included in the inventory because there is no activity associated with this equipment within the City.

2020 BAU GHG emissions were estimated by using City growth forecasts in employment provided by SCAG presented in Table 6. Growth in retail and non-retail employment was used to project emissions from light commercial equipment. Growth in industrial employment was used to project industrial, construction, and mining equipment. Similarly, agricultural employment growth was used to project agricultural equipment. Emissions from pleasure craft and recreational, lawn and garden, and entertainment equipment were projected using the growth in population.

4.5.3 Data Gaps

Off-road emissions were estimated based on the County-wide fuel combustion estimated generated by the OFFROAD model. Because activity data are not readily available on a scale smaller than the County level, the OFFROAD outputs were scaled by population and employment statistics to determine emissions associated with activities in Ontario. This approach assumes that off-road equipment can be reasonably approximated with population and employment. This is not necessarily the case, because various equipment emissions may not be equally represented in the cities based on population and employment. Area-specific data for off-road equipment are required to estimate more precise emissions at the city level.

4.5.4 Off-Road Equipment Emissions

Table 12 presents the 2008 and 2020 BAU emissions inventory for off-road equipment for Ontario.

Table 12. 2008 and 2020 Business as Usual Projected Off-Road Equipment Emissions

GHG Emissions	2008 Inventory ($MTCO_2e$)	2020 BAU Forecast ($MTCO_2e$)
Recreational equipment	1,629	2,158
Construction and mining equipment	112,881	149,541
Industrial equipment	18,518	23,826
Lawn and garden equipment	3,417	4,527
Light commercial equipment	6,334	9,131
Agricultural equipment	11,272	10,236
Transport refrigeration units	7,830	10,531
Entertainment equipment	56	74
Pleasure craft	14,348	19,008
Other portable equipment	28	38
Total Emissions ($MTCO_2e$)	**176,314**	**229,069**

4.6 Agriculture

Agriculture emissions accounted for approximately 12.1% of the City's total emissions in 2008. These emissions are direct Scope 1 emissions resulting from livestock activity and the application of fertilizer. Emissions of CH_4 and N_2O can result from livestock production through enteric fermentation and manure management (Intergovernmental Panel on Climate Change 2006b). CARB and Intergovernmental Panel on Climate Change (IPCC) Tier 1 methodology were used to calculate emissions. Emissions of N_2O can result from anthropogenic inputs of nitrogen into soil through fertilizers by way of direct (directly from the soils to which the nitrogen is added or released) and indirect (following volatilization of ammonia and nitrogen oxides from managed soils) pathways (Intergovernmental Panel on Climate Change 2006b). Both direct and indirect emissions of N_2O were calculated.

The three general sources of agricultural emissions evaluated in this inventory are livestock enteric fermentation, livestock manure management, and N_2O emissions from the application of fertilizer.

4.6.1 Data Acquisition and Sources

Data from the California Department of Conservation, Division of Land Resource Protection Farmland Mapping and Monitoring Program (FMMP) and additional geographic information systems (GIS) analysis using City data were used to determine grazing land and farmland acreage within the City (California Department of Conservation, Division of Land Resource Protection 2008). Counts of City of Ontario livestock for the year 2008 were obtained through the state Department of Food and Agriculture's Agricultural Statistics (California Department of Food and Agriculture 2008) and the Regional Water Quality Control Board for the Santa Ana

Region (Kashak pers. comm.). Counts of City of Ontario swine were obtained from the U.S. Department of Agriculture's (USDA's) Census of Agriculture, using 2007 data as a proxy for the year 2008.

4.6.2 Emissions Calculations and Methodologies

All agriculture emissions were calculated using CARB and IPCC methodology (Intergovernmental Panel on Climate Change 2006b; California Air Resources Board 2010b). Livestock counts were provided for the City of Ontario. County swine counts were apportioned based on the percent of grazing land in the City, as determined by the FMMP data and the additional GIS analysis. A count of San Bernardino County chickens did not specify any activity for the City (Krygier pers. comm.).

Emissions of N_2O from inputs of nitrogen into soil through fertilizers were calculated using an average quantity of nitrogen applied in synthetic fertilizer for crops of 140 pounds per acre per year (Miyao pers. comm.). It was assumed that all crops in Ontario use the same rate of fertilizer application, and that all crops use synthetic fertilizer to be conservative (organic fertilizers produce much lower N_2O emissions). Crop acreage was determined through the 2007 FMMP report and additional GIS analysis by summing acreage under the categories labeled *Farmland*. The N_2O emissions from fertilizer application on farmland were calculated using the equations provided by CARB (California Air Resources Board 2010b).

The 2020 BAU GHG emissions were based on the City's estimate that all agricultural activities would be transitioned by 2050. A linear extrapolation of farmland and grazing land was used to forecast the amount of land available in 2020 for livestock activity and the application of fertilizer. This resulted in an annual decline rate of about 3% for all agriculture activities.

4.6.3 Data Gaps

Emission factors can vary depending on the specific type of livestock and manure management system. The emission factors used in the inventory were based on averages that were determined for CARB's statewide inventory. In addition, the actual quantity of nitrogen-based fertilizer applied to farmland within City boundaries, on a per-acre basis, would refine the estimate of N_2O emissions from fertilizer application.

4.6.4 Agriculture Emissions

Table 13 presents agriculture emissions for Ontario for enteric fermentation, manure management, and fertilizer application.

Table 13. 2008 and 2020 Business as Usual Projected Agriculture Emissions by Source

Category	2008 Inventory ($MTCO_2e$)	2020 BAU Forecast ($MTCO_2e$)
CH_4 (Enteric fermentation and manure management)	335,690	304,828
N_2O (Enteric fermentation, manure management, and fertilizer application)	20,441	18,562
Total Emissions ($MTCO_2e$)	**356,131**	**323,390**

4.7 Solid Waste Management

Total emissions from solid waste generated by the City of Ontario accounted for approximately 2.0% of the City's 2008 inventory. These emissions occur at numerous landfills throughout the state and are considered a Scope 2 emission source. The materials disposed of by the City are recycled, composted, or placed in a landfill. Landfill-related emissions from waste are primarily CH_4, which is released over time when waste decomposes in a landfill. Organic waste that is buried in landfills decomposes under anaerobic conditions to produce CH_4, which has a GWP that is 21 times that of CO_2.

Waste generated in the City is either diverted or transported to a landfill. Both of the landfills currently used for disposal of City waste are located outside the City. According to CalRecycle, approximately half of the cities in the County have landfills located within their own city limits. Landfill emissions do not occur within the boundaries of every city generating the waste; however, every city is responsible for creating this waste and subsequent landfill emissions. Thus, emissions from the decomposition in landfills of waste produced by Ontario in 2008 are included in the inventory.

Milliken Sanitary Landfill's current status and characteristics are listed in Table 15. The emissions from this landfill are included as an informational item only as a CAP planning tool. Because this landfill accepts waste from many jurisdictions, landfill-related emissions are not related to City population, waste generated by City or municipal facilities, or behavioral or regulatory changes related to waste generation that happen within the City.

4.7.1 Data Acquisition and Sources

In 2009, the CARB conducted a study to examine the CH_4 reduction potential of proposed landfill regulation (California Air Resources Board 2009). The report contains data on the majority of landfills in the state, including opening year, closing year, 1990 waste in place, 2006 waste in place, and estimated 2020 waste in place, as well as the control technologies installed at each landfill. This report was used for calculating both site-based and generation-based emissions.

Additional data for the landfill within the City were collected from CalRecycle and the EPA Landfill Methane Outreach Program (LMOP) database (U.S. Environmental Protection Agency 2009). This information included annual waste disposal during 1995–2009 for each landfill. Specific CH_4 capture data, including measured flow rates of landfill gas, were obtained from the EPA LMOP database (U.S. Environmental Protection Agency 2009). These data were supplemented by a report detailing CH_4 capture rates for a few landfills in California (Themelis and Ulloa 2007).

Projection data used to estimate waste disposed prior to 1995 and after 2009 were obtained from SCAG and the California Department of Finance (Southern California Association of Governments 2012; California Department of Finance 2010a, 2010b, 2010c, 2010d).

4.7.2 Emission Calculations and Methodologies

There are two methods for calculating emissions from solid waste disposed in landfills: site-based and generation-based. Generation-based emissions were included in the inventory; site-based emissions were not included (but are provided for informational purposes).

4.7.2.1 Site-Based Emissions

Site-based emissions, which include emissions from the landfill located within the City boundaries, were estimated as an informational item but were not included in the inventory. This is because Milliken Sanitary Landfill accepts waste from numerous cities, and Ontario is not responsible for generating much of this waste. Ontario also has no jurisdiction to reduce waste disposal from these other cities as part of the CAP. Emissions from waste disposed of by Ontario are included in the inventory as generation-based emissions discussed in the following section.

Site-based emissions were included as an informational item to help Ontario identify site-based waste control measures to reduce CH_4 emissions from Milliken Sanitary Landfill (such as landfill caps and CH_4 flaring systems). The site-based approach calculates landfill emissions for the inventory year based on the landfills located within the geographic boundaries of the jurisdiction, regardless of when the waste was disposed of. This method is also known as waste in place and is a suitable method for calculating the amount of landfill gas available for flaring, heat recovery, and energy generation.

CARB's First Order Decay model was used to estimate CH_4 emissions from landfills (California Air Resources Board 2010c) for the site-based method. This is an Excel-based model that is consistent with IPCC-recommended methodologies for estimating waste decay rate, CH_4, and CO_2 emissions. The model requires the following inputs: year of opening, year of closing, annual waste deposition, and local annual precipitation rate. For site-based emissions, specific landfill data from CalRecycle, the EPA, and a CH_4 generation study (CalRecycle 2010a; U.S. Environmental Protection Agency 2009; Themelis and Ulloa 2007) were input to the model. Only total waste in place data were available. For disposal in the landfills for all years, it was assumed that waste was deposited evenly over each year of operation. A landfill-specific CH_4 capture rate of 63% was used based on research conducted for San Bernardino County.

For estimating site-based emissions in 2020, a linear extrapolation of population growth for Ontario, combined with the average per-capita waste disposal rate in 2009, was used (CalRecycle 2010b). It was assumed that the cities would deposit waste generated in 2020 in the same landfills accepting waste from the cities in 2009. The CH_4 capture efficiency for landfills in 2020 also was assumed to be equal to 2009.

4.7.2.2 Generation-Based Emissions

Generation-based emissions for 2008 and 2020 were estimated and included in the inventory. These emissions can help the City identify generation-based waste control measures to reduce CH_4 emissions from landfills (such as source reduction or recycling programs). This approach estimates baseline landfill emissions based on the

amount of current annual waste generated within City boundaries and the landfills where the waste is deposited, regardless of whether the waste is deposited in a landfill within the jurisdiction. This approach discloses the annual landfill emissions associated with annual waste generation.

CARB's First Order Decay model was used to estimate CH_4 emissions from landfills (California Air Resources Board 2010c). For generation-based emissions, the First Order Decay model was run for the City of Ontario assuming the City was a hypothetical landfill. For landfills listed as having CH_4 capture or flaring technologies installed, but not having specific information on the efficiency of the CH_4 capture, a default CH_4 destruction efficiency of 75% was assumed (U.S. Environmental Protection Agency 1998).

The waste generated in the City, along with the destination landfill of that waste, was provided by the City, and landfill details were identified based on CalRecycle data for the years 1995–2009. For each landfill, the CH_4 capture efficiency was determined using the EPA's LMOP database and a CH_4 generation study (U.S. Environmental Protection Agency 2009; Themelis and Ulloa 2007). Waste deposited in 2008 in each landfill was compared to the landfill's CH_4 capture efficiency for the given year, if applicable, to develop a profile of CH_4 emissions for each ton of waste landfilled by the City in 2008. It was assumed that the k-value for each City landfill was 0.02, which represents areas with annual average rainfall of less than 20 inches because most of the waste generated by the cities ends up in landfills located in the region.

For estimating waste generation in 2020, a linear extrapolation of population growth for the City, combined with the average per-capita waste disposal rate in 2008, was used (California Department of Finance 2010d; CalRecycle 2010b). It was assumed that the City would deposit waste generated in 2020 in the same landfills accepting waste from the cities in 2009. The CH_4 capture efficiency for landfills in 2020 was also assumed to be equal to 2008.

4.7.3 Data Gaps

Site-specific landfill CH_4 capture rates would improve this sector of the inventory. Landfill emissions are based on the consolidated landfill report prepared by CARB and data from CalRecycle for 2008. The CARB report contained waste in place information for all landfills in the County. Although individual landfill operators may collect data on site related to the maintenance and operation of gas flaring systems, these data are not always sufficient to estimate precise CH_4 destruction efficiency. This information was not included in the summary report prepared by CARB in 2009 (California Air Resources Board 2009). Individual landfill operators were not contacted for the purposes of data collection. Additional CH_4 capture rates were found by Themelis and Ulloa (2007) but not for all landfills where the City is sending its waste.

4.7.4 Solid Waste Management Emissions

Table 14 presents generation-based solid waste emissions. Table 15 shows the landfills used by the City but located outside of City jurisdictional boundaries. This table also states whether the landfill is open or closed, the amount of waste in place at the landfill in 2008, and the associated CH_4 emissions.

Table 14. Generation-Based Solid Waste Management Greenhouse Gas Emissions for 2008 and 2020 Business as Usual Forecast

Category	2008 Inventory	2020 BAU Forecast
Waste disposed of (tons)	256,328	288,659
Waste disposed of 1950–2008 and 1950–2020 (tons)	10,158,605	13,171,007
Total CH_4 Emissions (MTCO2e)	**60,000**	**64,326**

Table 15. Site-Based Solid Waste Management Emissions for 2008 and 2020 Business as Usual Forecast

	2008 Inventory			2020 Projection		
Landfill Name	Open/ Closed	Waste in Place (tons)[1]	CH_4 Emissions ($MTCO_2e$)	Open/ Closed	Waste in Place (tons)[1]	CH_4 Emissions ($MTCO_2e$)
Milliken Sanitary Landfill (SWIS # 36-AA-0054)	Closed	12,011,629	60,787	Closed	12,011,629	47,817
Total Emissions ($MTCO_2e$)			**60,787**			**47,817**

[1] The 2008 value was estimated based on the full capacity of the landfill and the amount of waste in place in 2006, as provided by the CARB (2009).

Sources: California Air Resources Board 2009, 2010c.

4.8 Wastewater Treatment

There is one wastewater treatment plant (WWTP) located within the boundaries of this inventory. Wastewater generated by Ontario is treated at IEUA Regional Water Recycling Plant No. 1 (RP-1). This facility serves the cities of Ontario, Rancho Cucamonga, Upland, Montclair, and Fontana and an unincorporated area of San Bernardino County. The GHG emissions result from electricity and/or natural gas used to power the facility. These emissions are classified as Scope 1 (natural gas) and Scope 2 (electricity) and are included in the inventory in the building energy sector above. Additional emissions of CH_4 and N_2O result from the treatment and breakdown of waste in the facility. These are commonly referred to as fugitive emissions, are classified as Scope 1 emissions, and are included in the inventory. Although the IEUA RP-1 plant captures some fugitive emissions (biogas) on site and uses it for local power, the total amount captured was unavailable at the time of analysis. Therefore, all fugitive emissions are included in the inventory.

Wastewater generated in the City will be sent to IEUA RP-1, along with wastewater generated by the other regions served by this facility. Only the fugitive emissions occurring as a result of treating wastewater generated by the City were included in the inventory because the City is not responsible for generating all of the wastewater treated by IEUA RP-1. GHG emissions due to fugitive emissions at these facilities are listed in Table 16. These emissions represented 0.2% of the total emissions.

4.8.1 Data Acquisition and Sources

For each of its WWTPs, IEUA provided daily influent flow, population served, amount of digester gas combusted, average nitrogen load, and biochemical oxygen demand (BOD_5) load (Tam pers. comm.).

4.8.2 Emissions Calculations and Methodologies

Equations 10.3 and 10.4 in CARB's Local Government's Operating Protocol (California Air Resources Board et al. 2010) were used to estimate fugitive emissions of CH_4 and N_2O resulting from wastewater treatment. These equations require the following inputs: daily influent flow, population served, amount of biogas produced, average nitrogen load, and BOD_5 load. These standard equations are recommended for use by local governments in preparing GHG inventories and consistent with methodologies used for national and state-level inventories.

4.8.3 Data Gaps

The estimate of GHG emissions associated with wastewater treatment by the City is based on the City's population, and not on actual emissions resulting from WWTP activities within City boundaries. If these activities at IEUA RP-1 could be disaggregated to the City level, this information would provide for a more accurate estimate of GHG emissions from wastewater treatment. In addition, the amount of biogas produced at the IEUA RP-1 plant was unavailable at the time of analysis. This information would refine the estimate of fugitive emissions in the inventory.

4.8.4 Wastewater Treatment Plant Emissions

Table 16 presents GHG emissions from WWTPs.

Table 16. 2008 and 2020 Business as Usual Projected Fugitive Wastewater Treatment Emissions

Greenhouse Gas Emissions	2008 Inventory ($MTCO_2e$)	2020 BAU Forecast ($MTCO_2e$)
CH_4 emissions	149	198
N_2O emissions	11	15
Total Emissions ($MTCO_2e$)	**6,587**	**8,781**

4.9 Water Transport, Distribution, and Treatment

Emissions related to the transport, distribution, and treatment of water accounted for approximately 1.0% of total emissions in 2008. The City's water consumption results in indirect emissions from the following activities: electricity consumption for water supply and conveyance, water treatment, water distribution, and wastewater treatment. All wastewater treatment emissions are accounted for in Section 4.1, *Building Energy Use*, and Section 4.8, *Wastewater Treatment*. The emissions were calculated based on whether the source of water was located in the City and whether the water consumption–related activity occurred in the City. For local sources of water, the emissions resulting from water supply and conveyance, water treatment, and water distribution also have been included in this sector (electricity provided by SCE in a general *Water* category). Additional emissions from electricity associated with other local water-related activities were accounted for in Section 4.1, *Building Energy Use*, as these activities were assumed to be occurring within the City. For non-local sources of water, such as the State Water Project, this sector includes:

- Transporting water to the City from other areas in the state (water supply and conveyance).;
- Treatment of water at facilities not located in the City (water treatment).
- Distributing this water to the City (water distribution).

Where utility data are not available, emissions from water consumption can be estimated using an activity-based approach. The CEC 2006 report, *Refining Estimates of Water-Related Energy Use in California*, provides proxies for embodied energy use for water in southern and northern California (California Energy Commission 2006b).

This hybrid approach using both utility data and activity data was used to minimize double-counting of emissions for the City. Table 17 presents how utility data were used in conjunction with the activity-based approach to estimate emissions for local and non-local sources of water, as applied specifically to the City.

Table 17. Water Transport, Distribution, and Treatment Data Source Mapping

Source/Activity	Water Supply and Conveyance	Water Treatment	Water Delivery
Local	Utility data	Activity data	Utility data
Nonlocal	Activity data	Activity data	Utility data

4.9.1 Data Acquisition and Sources

Water supply data were provided by the *City of Ontario 2005 Urban Water Management Plan* (UWMP) (City of Ontario 2005). For all sectors described below, water supply data were provided for 2005, 2010, 2015, and 2020.

Because the UWMP provides water quantity forecasts every 5 years starting in 2005, the water quantity for the 2008 base year of the inventory was estimated based on an average growth rate, using the 2005 data and the 2010 forecast. This estimate then was combined with the electricity emission factors to develop the indirect emissions estimate.

4.9.2 Emission Calculations and Methodologies

Methods for calculating emissions associated with City municipal water consumption, including water supply and conveyance, water treatment, and water distribution are described below.

4.9.2.1 Water Supply and Conveyance

Water supply involves indirect emissions from the generation of electricity required to supply each city with water. The City's water includes a mix of local and non-local sources of water. The local sources of water include groundwater and recycled water from the wastewater treatment plant located in the City. For local sources of water, the emissions are assumed to be included either in the utility data category in Table 18 or in Section 4.1, *Building Energy Use*. The non-local sources of water include deliveries from the State Water Project, transfers from third parties, and desalinated water. For non-local sources, the energy intensity associated with water

supply and conveyance in southern California is approximately 9,727 kWh/million gallons (MG) (California Energy Commission 2006b).

Information in the CEC report regarding electricity usage and loss factors, and imported water quantities provided by the UWMP, was used to calculate indirect emissions from water importation to the City in 2008 (California Energy Commission 2006b; City of Ontario 2005). Electricity emission factors for the CAMX/WECC California region were used to calculate GHG emissions (724.12 pounds CO_2/megawatt hour [MWh], 30.24 pounds CH_4/gigawatt hour [GWh], and 8.08 pounds N_2O/GWh) because electricity used to transport water to the City facilities is supplied by many utilities within this region (U.S. Environmental Protection Agency 2010b).

The emissions for the BAU forecast for 2020 were estimated using projected water quantities for the City in 2020 obtained from the UWMP and emission factors discussed above.

4.9.2.2 Water Treatment

Before water is pumped to each city, it is purified by passing through various treatment processes. Because the City does not own or operate any water treatment plants, most electricity consumed to treat water for City use is not included in the utility data provided in Section 4.1, *Building Energy Use*. However, the City does own groundwater wells in the Chino Basin, and any treatment of this water occurring in the City is included in the utility data in Table 18. Because the City relies on water treatment services occurring outside City boundaries, emissions associated with electricity consumed for water treatment processes were included in the inventory. The energy intensity for water treatment is approximately 111 kWh/acre-foot of water (California Energy Commission 2006b).

The emissions for the BAU forecast for 2020 were estimated using projected water quantities for the City in 2020 obtained from the City of Ontario UWMP and emission factors discussed above.

4.9.2.3 Water Distribution

Water distribution involves distributing water to end users within a region. The energy intensity in distribution is directly related to the distance and lift involved in transporting water from the conveyance terminus to the retail customers. Because the City operates its own water utility, it is assumed that water distribution electricity use was included in either the utility data category in Table 18 or the utility data provided above in Section 4.1., *Building Energy Use*. Consequently, emissions associated with this electricity were not included as a separate category in the inventory.

The emissions for the BAU forecast for 2020 were estimated using the same methodology for the building energy use section and emission factors discussed above.

4.9.3 Data Gaps

Emission estimates related to the City's water consumption uses two methods that can result in varying degrees of accuracy. Applying the methodology used in the CEC report can result in higher estimates of emissions if the City's water infrastructure is less energy-intensive than the average water infrastructure in the state. Conversely, relying only on utility data can result in a lower emissions estimate because some activities are occurring outside of the City's boundary.

4.9.4 Water Consumption Emissions

Table 18 presents water consumption and the emissions associated with water supply and conveyance, water treatment, and water distribution for 2008 and for the 2020 BAU Forecast.

Table 18. 2008 and 2020 Business as Usual Forecast Water Transport, Distribution, and Treatment Emissions

Category	2008 Inventory	2020 BAU Forecast
Water Consumption (acre-feet)	54,610	76,585
GHG Emissions ($MTCO_2e$)		
Water supply and conveyance	19,933	25,787
Water treatment	568	796
Water distribution[1]	0	0
Utility data (local water activity)[2]	8,544	11,993
Total Emissions ($MTCO_2e$)	**29,044**	**38,575**

[1] Emissions are accounted for in the *Utility data* category or in Section 4.1, *Building Energy Use.*

[2] Includes energy-consuming activities related to water occurring in the City, such as groundwater pumping, water distribution, and local water treatment. Emissions from all other categories in this table are occurring outside of City boundaries, but are due to activities necessary to provide water to the City itself.

4.10 Indirect Emissions of Sulfur Hexafluoride due to Electricity Consumption

Emissions of SF_6 from transmission of electricity to the City accounted for approximately 0.2% of total emissions in 2008. These emissions include leaked SF_6 from electrical transmission and distribution systems, and are classified as a Scope 2 emissions source. SF_6 is used to insulate power switching equipment and transformers (CEC 2006c). SF_6 emissions are based on electricity consumption in Ontario.

Table 19 presents 2008 and 2020 BAU forecast GHG emissions of SF_6 from electricity consumption. SF_6 emissions are generally a function of population and employment in Ontario, as population and employment are good indicators of electricity consumption.

4.10.1 Data Acquisition and Sources

Electricity consumption data were obtained from Southern California Edison, as described in Section 4.1.1. The emission factor for SF_6 was obtained from CARB (2010b).

4.10.2 Emission Calculations and Methodologies

Total electricity consumption for the City was multiplied by the SF_6 emission factor obtained from CARB. CARB estimates the California statewide emissions of SF_6 from electricity transmission and distribution to be fairly constant from 2000 to 2008, and emissions are not expected to increase very much by 2020. The CARB's per-

kWh emission rate for SF_6 in 2008 was used to estimate emissions from each city in 2008 and 2020 (California Air Resources Board 2010b). Emissions of SF_6 were multiplied by the GWP of SF_6, which is 23,900.

4.10.3 Data Gaps

The current methodology assumes a statewide average emission rate of SF_6 from electrical power switching equipment and transformers in the City. It is possible that the emission rate in the county is different from the statewide average, so a region-specific emission factor would improve the estimate of emissions in this sector. In addition, because this sector is dependent on the amount of electricity consumed by Ontario, the data gaps listed in the building energy sector also apply to this sector.

4.10.4 SF6 from Electricity Consumption Emissions

Table 19 presents SF6 from Electricity Consumption Emissions for 2008 and for the 2020 BAU Forecast.

Table 19. 2008 and 2020 Business as Usual Forecast SF6 from Electricity Consumption Emissions

Category	2008 Inventory	2020 BAU Forecast
Total Electricity Consumption (kWh)	1,617,154,790	2,154,366,297
SF6 Emissions (kg)	222	296
Total Emissions ($MTCO_2e$)	**5,310**	**7,072**

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CITY OF ONTARIO

Community Climate Action Plan

Appendix B

Greenhouse Gas Emissions CEQA Thresholds and Screening Tables

GREENHOUSE GAS EMISSIONS

CEQA Thresholds and Screening Tables
City of Ontario, California

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Resolution No. 2012-122

CONTENTS

TABLES

Introduction

The Ontario Climate Action Plan (CAP) includes reducing 39,769 Metric Tons of Carbon Dioxide Equivalents ($MTCO_2e$) per year from new development by 2020 as compared to the 2020 unmitigated conditions. This requires new development to be 25% more efficient. Reductions related to transportation, water, solid waste, energy, and renewable energy sources all play a part in gaining this level of efficiency within new development.

Mitigation of GHG emissions impacts through the Development Review Process (DRP) provides one of the most substantial reduction strategies for reducing community-wide emissions associated with new development. The DRP procedures for evaluating GHG impacts and determining significance for CEQA purposes will be streamlined by (1) applying an emissions level that is determined to be less than significant for small projects, and (2) utilizing Screening Tables to mitigate project GHG emissions that exceed the threshold level. Projects will have the option of preparing a project-specific technical analysis to quantify and mitigate GHG emissions. A threshold level of 3,000 $MTCO_2e$ per year will be used to identify projects that require the use of Screening Tables or a project-specific technical analysis to quantify and mitigate project emissions.

The California Environmental Quality Act ("CEQA") requires assessment of the environmental impacts of proposed projects including the impacts of greenhouse gas (GHG) emissions. The purpose of this document is to provide guidance on how to analyze GHG emissions and determine the significance of those emissions during CEQA review of proposed development projects within the City of Ontario. The analysis, methodology, and significance determination (thresholds) are based upon the CAP, the GHG emission inventories within the CAP, and the GHG reduction measures that reduce emissions to the AB-32 compliant reduction target of the CAP. The Screening Tables can be used by the City of Ontario Community Development Department for review of development projects in order to ensure that the specific reduction strategies in the CAP are implemented as part of the CEQA process for development projects. The Screening Tables provide a menu of options that both ensures implementation of the reduction strategies and flexibility on how development projects will implement the reduction strategies to achieve an overall reduction of emissions, consistent with the reduction target of the CAP.

California Environmental Quality Act

CEQA MANDATES FOR ANALYSIS OF IMPACTS

CEQA requires that Lead Agencies inform decision makers and the public regarding the following: potential significant environmental effects of proposed projects; feasible ways that environmental damage can be avoided or reduced through the use of feasible mitigation measures and/or project alternatives; and the reasons why the Lead Agency approved a project if significant environmental

effects are involved (CEQA Guidelines §15002). CEQA also requires Lead Agencies to evaluate potential environmental effects based to the fullest extent possible on scientific and factual data (CEQA Guidelines §15064[b]). A determination of whether or not a particular environmental impact will be significant must be based on substantial evidence, which includes facts, reasonable assumptions predicated upon facts, and expert opinion supported by facts (CEQA Guidelines §15064f[5]).

The recently amended CEQA Guidelines (CEQA Guidelines §15064.4[a] [b]) explicitly requires Lead Agencies to evaluate GHG emissions during CEQA review of potential environmental impacts generated by a proposed project. To assist in this effort, two questions were added to Appendix G of the CEQA Guidelines:

- Would the project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?
- Would the project conflict with any applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs?

Finally, under the "rule of reason," an EIR is required to evaluate impacts to the extent that is reasonably feasible ([CEQA Guideline § 15151; *San Francisco Ecology Center v. City and County of San Francisco* (1975) 48 Cal.App.3rd 584]). While CEQA does require Lead Agencies to make a good faith effort to disclose what they reasonably can, CEQA does not demand what is not realistically possible ([*Residents at Hawks Stadium Committee v. Board of Trustees* (1979) 89 Cal.App.3rd 274, 286]).

Greenhouse Gas Impact Determination

STATEWIDE OR REGIONAL THRESHOLDS OF SIGNIFICANCE

There are currently no published statewide thresholds of significance for measuring the impact of GHG emissions generated by a proposed project. CEQA Guidelines §15064.7 indicates only that, "each public agency is encouraged to develop and publish thresholds of significance that the agency uses in the determination of the significance of environmental effects." The County of San Diego has published draft thresholds that, when finalized, jurisdictions within the County can use if they do not have their own thresholds and GHG mitigation plans. However, the CAP for the City of Ontario addresses cumulative GHG emissions, has a reduction target that reduces the cumulative GHG impacts to less than significant, has a set of reduction measures that achieves the reduction target and provides an implementation plan to implement the reduction measures. This document provides guidance in how to address GHG emissions in CEQA analysis and determine the significance of project generated GHG emissions.

QUANTITATIVE ANALYSIS RELATIVE TO THE ONTARIO CLIMATE ACTION PLAN

METHODOLOGY OVERVIEW

An individual project cannot generate enough GHG emissions to influence global climate change. The project participates in this potential impact by its incremental contribution combined with the cumulative increase of all other sources of GHGs, which when taken together may have a significant impact on global climate change. To address the State's requirement to reduce GHG emissions, the City prepared the CAP with the target of reducing GHG emissions within Ontario by 30 percent below 2020 business as usual (BAU) emissions. The City's target is consistent with AB 32 and ensures that Ontario is providing GHG reductions locally that will complement the State and international efforts of stabilizing climate change.

Because the City's CAP addresses GHG emissions reduction, is in concert with AB 32 and international efforts to address global climate change, and includes specific local requirements that will substantially lessen the cumulative problem, compliance with the CAP fulfills the description of mitigation found in CEQA Guidelines §15130(a)(3) and §15183.5.

Because GHG emissions are only important in the context of cumulative emissions, the focus of the analysis is on answering the question of whether incremental contributions of GHGs are a cumulatively considerable contribution to climate change impacts. The CAP includes a set of mitigation measures designed to substantially lessen cumulative impacts associated with GHG emissions as described in CEQA Guidelines §15130(a)(3), in determining if a project's effects will result in significant impacts. The CAP has the following components that fulfill cumulative mitigation for GHG emissions:

1. The CAP provides a community-wide GHG emissions reduction target that will substantially lessen the cumulative impact;
2. The CAP provides measures that new development projects must follow to meet the City's reduction target and substantially lessen the cumulative impact;
3. The CAP provides a set of GHG emission inventories that provides quantitative facts and analysis of how the measures within the CAP meet the reduction target that substantially lessens the cumulative impact:
4. The CAP provides an implementation, monitoring and update program to insure that the reduction target is met.

The CAP satisfies the first condition by adopting a target of reducing GHG emissions within Ontario by 30 percent below 2020 business as usual (BAU), which also equates to approximately 15 percent below existing levels within the City of Ontario by 2020. This reduction target is compliant with AB 32; the AB 32 Climate Change Scoping Plan states: "In recognition of the critical role local governments will play in the successful implementation of AB 32, ARB recommended a greenhouse gas reduction goal for local

governments of 15 percent below existing levels by 2020 to ensure that their municipal and community-wide emissions match the State's reduction target" (Scoping Plan page ES-5, CARB, December 2008). In this way, the City is teaming with the State's efforts to reduce GHG emissions globally and substantially lessen the cumulative problem.

The CAP satisfies the second condition through the implementation of the reduction measures for new development. This document supplies the specific criteria that new development must follow to ensure that the reduction measures associated with new development are implemented and the reduction target is met.

The CAP satisfies the third criteria by providing a set of community-wide GHG emissions inventories for existing conditions (2008 baseline), for future 2020 GHG emissions that are anticipated without the reduction measures (Business As Usual; BAU), and reduced levels of 2020 GHG emissions which demonstrates how the implementation of reduction measures achieves the reduction target (30 percent below 2020 business as usual (BAU) emissions). These community-wide GHG emission inventories are found in the appendices of the CAP.

THE DEVELOPMENT REVIEW PROCESS

Integrating the reduction measures of the CAP into the CEQA development review process is the first step in determining how a proposed project will implement the GHG reduction measures within the CAP. The GHG emissions development review process is predicated on a couple of questions. Appendix A of this document is a flow chart that diagrams this development review process. The questions are as follows:

Question 1: Is the Project exempt under CEQA? If it is, then SCAQMD has determined that GHG emissions are less than significant and no additional GHG reductions are needed. A list of CEQA Exemptions are found in CEQA Guidelines §15300 through §15332. There are exemption opportunities associated with transit oriented development (TOD) associated with the Sustainable Communities Strategy (SCS) for the region developed by the Southern California Association of Governments (SCAG) and first introduced in the 2012 Regional Transportation Plan (RTP). Exemptions associated with TOD are divided into two categories, transit priority projects (TPP), and Sustainable Community Projects (SCP). A TPP and SCP Checklist is provided in Appendix B of this document to assist project applicants in determining if a project qualifies for these Exemptions under CEQA. If the Project does not qualify for a CEQA exemption, then move on to Question 2.

Question 2: Are Project GHG emissions less than 3,000 metric tons carbon dioxide equivalents ($MTCO_2e$) per year? To assist applicants in answering this question Appendix C of this document includes a table showing various sizes of typical land use development projects that are typically at or below that level of emissions. Applicants can also calculate emissions using the methodology described below to answer this question. Additional information is provided below on how this level of emissions was determined and what needs to be done if your project is at or below this amount. If the project is above 3,000 $MTCO_2e$ then the applicant needs to either use the screening tables or analyze GHG emissions and provide additional mitigation as shown in Appendix A.

METHODOLOGY FOR THE CALCULATION OF GHG EMISSIONS

Analysis of development projects can either be done through emissions calculations or by using the screening tables beginning on page 6.

Total GHG emissions are the sum of emissions from both direct and indirect sources. Direct sources include mobile sources such as construction equipment, motor vehicles, landscape equipment; and stationary sources such as cooling and heating equipment. Indirect sources are comprised of electrical, and potable water use, and the generation of solid waste, and waste water.

Direct GHG emissions from mobile and stationary sources are determined as the sum of the annual GHG emissions from construction equipment, motor vehicles, landscape equipment, and heating and cooling equipment.

Indirect sources are determined based on source as follows. Electrical usage is reported as annual emissions from electrical usage. Potable water usage is reported as the annual emissions from electricity used for potable water treatment and transportation. Solid waste is reported as the sum of annual emissions from solid waste disposal treatment, transportation, and fugitive emissions of methane at the solid waste facilities. Wastewater usage is reported as the annual emissions from wastewater transport and treatment.

Analysis of development projects not using the screening tables should use the emission factors found in the latest version of the California Climate Action Registry (CCAR) General Reporting Protocol. Quantification of emissions from electricity used for potable water treatment and transportation as well as wastewater transport and treatment can be found in the California Energy Commission (CEC) document titled "Refining Estimates of Water-Related Energy Use in California (CEC December 2006).

3,000 MT CO_2e Emission Level

The City determined the size of development that is too small to be able to provide the level of GHG emission reductions expected from the Screening Tables based upon the 90th percentile capture rate concept. To do this the City determined the GHG emission amount allowed by a project such that 90 percent of the emissions on average from all projects would exceed that level and be "captured" by the Screening Table.

In determining this level of emissions the City used the database of Projects kept by the Governor's Office of Planning and Research (OPR). That database contained 798 Projects, 60 of which were extremely large General Plan Updates, Master Plans, or Specific Plan Projects. The 60 very large projects were removed from the database in order not to skew the emissions value, leaving a net of 738 Projects.

In addition, 27 projects were found to be outliers that would skew the emission value to high, leaving 711 as the sample population to use in determining the 90th percentile capture rate.

The analysis of the 738 Projects within the sample population combined commercial, residential, and mixed use projects. Also note that the sample of projects included warehousing and other industrial land uses but did not include industrial processes (i.e. oil refineries, heavy manufacturing, electric generating stations, mining operations, etc.). Emissions from each of these Projects were calculated by SCAQMD and provide a consistent method of emissions calculations across the sample population further reducing potential errors in the statistical analysis. In calculating the emissions from Projects within the sample population, construction period GHG emissions were amortized over 30-years (the average economic life of a development project). Direct GHG emissions were calculated using URBEMIS and indirect electricity/water use GHG emissions calculated separately and added to the URBEMIS output.

This analysis determined that the 90th percentile ranged from 2,983-3,143 $MTCO_2e$ per year.

The **3,000 MT CO_2e per year** value is used in defining small projects that, when combined with the modest efficiency measures shown in the bullet points below are considered less than significant and do not need to use the Screening Tables or alternative GHG mitigation analysis described below. The efficiency measures required of small projects are summarized below:

- Energy efficiency of at least five percent greater than Title 24 requirements or other equivalent levels of GHG reductions, and
- Water conservation measures that matches the California Green Building Code or equivalent levels of GHG reductions

Screening Threshold Tables

The purpose of this Screening Table is to provide guidance in measuring the reduction of greenhouse gas emissions attributable to certain design and construction measures incorporated into development projects. The analysis, methodology, and significance determination (thresholds) are based upon the CAP, which includes GHG emission inventories (2008 and 2020 forecasts), a year 2020 emission reduction target, the goals and policies to reach the target, together with the Addendum prepared for the CAP. The methodology for the development and application of the Screening Table is set forth in Appendix D of this document.

Instructions for Residential, Commercial, or Industrial Projects

The Screening Table assigns points for each option incorporated into a project as mitigation or a project design feature (collectively referred to as "feature"). The point values correspond to the minimum emissions reduction expected from each feature. The menu of features allows maximum flexibility and options for how development projects can implement the GHG reduction measures. The point levels are based upon improvements compared to 2008 emission levels of efficiency. Projects that garner at least 100 points will be consistent with the reduction quantities anticipated in the City's CAP. As such, those projects that garner a total of 100 points or greater would not require quantification of project specific GHG emissions. Consistent with CEQA Guidelines, such projects would be determined to have a less than significant individual and cumulative impact for GHG emissions.

Instructions for Mixed Use Projects

Mixed use projects provide additional opportunities to reduce emissions by combining complimentary land uses in a manner that can reduce vehicle trips. Mixed use projects also have the potential to complement energy efficient infrastructure in a way that reduces emissions. For mixed use projects, fill out both Screening Table 1 and Table 2, but proportion the points identical to the proportioning of the mix of uses. As an example, a mixed use project that is 50% commercial uses and 50% residential uses will show ½ point for each assigned point value in Table 1 and Table 2. Add the points from both tables. Mixed use Projects that garner at least 100 points will be consistent with the reduction quantities in the City's CAP and are considered less than significant for GHG emissions.

Those projects that do not garnish 100 points using the screening tables will need to provide additional analysis to determine the significance of GHG emissions. Nothing in this guidance shall be construed as limiting the City's authority to adopt a statement of overriding consideration for projects with significant GHG impacts. The following tables provides a menu of performance standards/options related to GHG mitigation measures and design features that can be used to demonstrate consistency with the reduction measures and GHG reduction quantities in the CAP.

Table 1: Screening Table for Implementation of GHG Reduction Measures for Residential Development

Feature	Description	Assigned Point Values	Project Points
Reduction Measure PS E1: Residential Energy Efficiency			
Building Envelope			
Insulation	2008 Baseline (walls R-13:, roof/attic: R-30)	0 points	
	Modestly Enhanced Insulation (walls R-13:, roof/attic: R-38)	12 points	
	Enhanced Insulation (rigid wall insulation R-13, roof/attic: R-38)	15 points	
	Greatly Enhanced Insulation (spray foam wall insulated walls R-15 or higher, roof/attic R-38 or higher)	18 points	
Windows	2008 Baseline Windows (0.57 U-factor, 0.4 solar heat gain coefficient (SHGC)	0 points	
	Modestly Enhanced Window Insulation (0.4 U-Factor, 0.32 SHGC)	6 points	
	Enhanced Window Insulation (0.32 U-Factor, 0.25 SHGC)	7 points	
	Greatly Enhanced Window Insulation (0.28 or less U-Factor, 0.22 or less SHGC)	9 points	
Cool Roof	Modest Cool Roof (CRRC Rated 0.15 aged solar reflectance, 0.75 thermal emittance)	10 points	
	Enhanced Cool Roof(CRRC Rated 0.2 aged solar reflectance, 0.75 thermal emittance)	12 points	
	Greatly Enhanced Cool Roof (CRRC Rated 0.35 aged solar reflectance, 0.75 thermal emittance)	14 points	
Air Infiltration	Minimizing leaks in the building envelope is as important as the insulation properties of the building. Insulation does not work effectively if there is excess air leakage.		
	Air barrier applied to exterior walls, calking, and visual inspection such as the HERS Verified Quality Insulation Installation (QII or equivalent)	10 points	
	Blower Door HERS Verified Envelope Leakage or equivalent	8 points	
Thermal Storage of Building	Thermal storage is a design characteristic that helps keep a constant temperature in the building. Common thermal storage devices include strategically placed water filled columns, water storage tanks, and thick masonry walls.		
	Modest Thermal Mass (10% of floor or 10% of walls: 12" or more thick exposed concrete or masonry. No permanently installed floor covering such as carpet, linoleum, wood or other insulating materials)	2 points	
	Enhanced Thermal Mass (20% of floor or 20% of walls: 12" or more thick exposed concrete or masonry. No permanently installed floor covering such as carpet, linoleum, wood or other insulating materials)	4 points	

Feature	Description	Assigned Point Value	Project Points
Indoor Space Efficiencies			
Heating/ Cooling Distribution System	Minimum Duct Insulation (R-4.2 required)	0 points	
	Modest Duct insulation (R-6)	7 points	
	Enhanced Duct Insulation (R-8)	8 points	
	Distribution loss reduction with inspection (HERS Verified Duct Leakage or equivalent)	12 points	
Space Heating/ Cooling Equipment	2008 Minimum HVAC Efficiency (SEER 13/60% AFUE or 7.7 HSPF)	0 points	
	Improved Efficiency HVAC (SEER 14/65% AFUE or 8 HSPF)	4 points	
	High Efficiency HVAC (SEER 15/72% AFUE or 8.5 HSPF)	7 points	
	Very High Efficiency HVAC (SEER 16/80% AFUE or 9 HSPF)	9 points	
Water Heaters	2008 Minimum Efficiency (0.57 Energy Factor)	0 points	
	Improved Efficiency Water Heater (0.675 Energy Factor)	12 points	
	High Efficiency Water Heater (0.72 Energy Factor)	15 points	
	Very High Efficiency Water Heater (0.92 Energy Factor)	18 points	
	Solar Pre-heat System (0.2 Net Solar Fraction)	4 points	
	Enhanced Solar Pre-heat System (0.35 Net Solar Fraction)	8 points	
Daylighting	Daylighting is the ability of each room within the building to provide outside light during the day reducing the need for artificial lighting during daylight hours.		
	All peripheral rooms within the living space have at least one window (required)	0 points	
	All rooms within the living space have daylight (through use of windows, solar tubes, skylights, etc.)	1 points	
	All rooms daylighted	2 points	
Artificial Lighting	2008 Minimum (required)	0 points	
	Efficient Lights (25% of in-unit fixtures considered high efficacy. High efficacy is defined as 40 lumens/watt for 15 watt or less fixtures; 50 lumens/watt for 15-40 watt fixtures, 60 lumens/watt for fixtures >40watt)	8 points	
	High Efficiency Lights (50% of in-unit fixtures are high efficacy)	10 points	
	Very High Efficiency Lights (100% of in-unit fixtures are high efficacy)	12 points	
Appliances	Energy Star Refrigerator (new)	1 points	
	Energy Star Dish Washer (new)	1 points	
	Energy Star Washing Machine (new)	1 points	

Feature	Description	Assigned Point Values	Project Points
Miscellaneous Residential Building Efficiencies			
Building Placement	North/South alignment of building or other building placement such that the orientation of the buildings optimizes natural heating, cooling, and lighting.	5 point	
Shading	At least 90% of south-facing glazing will be shaded by vegetation or overhangs at noon on Jun 21st.	4 Points	
Energy Star Homes	EPA Energy Star for Homes (version 3 or above)	25 points	
Independent Energy Efficiency Calculations	Provide point values based upon energy efficiency modeling of the Project. Note that engineering data will be required documenting the energy efficiency and point values based upon the proven efficiency beyond Title 24 Energy Efficiency Standards.	TBD	
Other	This allows innovation by the applicant to provide design features that increases the energy efficiency of the project not provided in the table. Note that engineering data will be required documenting the energy efficiency of innovative designs and point values given based upon the proven efficiency beyond Title 24 Energy Efficiency Standards.	TBD	
Existing Residential Retrofits	The applicant may wish to provide energy efficiency retrofit projects to existing residential dwelling units to further the point value of their project. Retrofitting existing residential dwelling units within the City is a key reduction measure that is needed to reach the reduction goal. The potential for an applicant to take advantage of this program will be decided on a case by case basis and must have the approval of the Ontario Planning Department. The decision to allow applicants to ability to participate in this program will be evaluated based upon, but not limited to the following; Will the energy efficiency retrofit project benefit low income or disadvantaged residents? Does the energy efficiency retrofit project fit within the overall assumptions in reduction measures associated with existing residential retrofits? Does the energy efficiency retrofit project provide co-benefits important to the City? Point value will be determined based upon engineering and design criteria of the energy efficiency retrofit project.	TBD	
Reduction Measure PS E2: Residential Renewable Energy Generation			
Photovoltaic	Solar Photovoltaic panels installed on individual homes or in collective neighborhood arrangements such that the total power provided augments:		
	Solar Ready Homes (sturdy roof and solar ready service panel)	2 points	
	10 percent of the power needs of the project	10 points	
	20 percent of the power needs of the project	15 points	
	30 percent of the power needs of the project	20 points	
	40 percent of the power needs of the project	28 points	
	50 percent of the power needs of the project	35 points	
	60 percent of the power needs of the project	38 points	
	70 percent of the power needs of the project	42 points	
	80 percent of the power needs of the project	46 points	

Feature	Description	Assigned Point Values	Project Points
	90 percent of the power needs of the project	52 points	
	100 percent of the power needs of the project	58 points	
Wind turbines	Some areas of the City lend themselves to wind turbine applications. Analysis of the area's capability to support wind turbines should be evaluated prior to choosing this feature.		
	Individual wind turbines at homes or collective neighborhood arrangements of wind turbines such that the total power provided augments:		
	10 percent of the power needs of the project	10 points	
	20 percent of the power needs of the project	15 points	
	30 percent of the power needs of the project	20 points	
	40 percent of the power needs of the project	28 points	
	50 percent of the power needs of the project	35 points	
	60 percent of the power needs of the project	38 points	
	70 percent of the power needs of the project	42 points	
	80 percent of the power needs of the project	46 points	
	90 percent of the power needs of the project	52 points	
	100 percent of the power needs of the project	58 points	
Off-site renewable energy project	The applicant may submit a proposal to supply an off-site renewable energy project such as renewable energy retrofits of existing homes that will help implement renewable energy within the City. These off-site renewable energy retrofit project proposals will be determined on a case by case basis and must be accompanied by a detailed plan that documents the quantity of renewable energy the proposal will generate. Point values will be determined based upon the energy generated by the proposal.	TBD	
Other Renewable Energy Generation	The applicant may have innovative designs or unique site circumstances (such as geothermal) that allow the project to generate electricity from renewable energy not provided in the table. The ability to supply other renewable energy and the point values allowed will be decided based upon engineering data documenting the ability to generate electricity.	TBD	
Reduction Measure PS W1: Residential Water Conservation			
Irrigation and Landscaping			
Water Efficient Landscaping	Limit conventional turf to < 50% of required landscape area	0 points	
	Limit conventional turf to < 25% of required landscape area	4 points	
	No conventional turf (warm season turf to < 50% of required landscape area and/or low water using plants are allowed)	6 points	
	Only California Native Plants that requires no irrigation or some supplemental irrigation	8 points	

Feature	Description	Assigned Point Values	Project Points
Water Efficient irrigation systems	Low precipitation spray heads < .75"/hr or drip irrigation Weather based irrigation control systems or moisture sensors (demonstrate 20% reduced water use)	2 point 3 points	
Recycled Water	Recycled connections (purple pipe) to irrigation system on site	6 points	
Water Reuse	Gray water Reuse System collects Gray water from clothes washers, showers and faucets for irrigation use,	12 points	
Storm water Reuse Systems	Innovative on-site stormwater collection, filtration and reuse systems are being developed that provide supplemental irrigation water and provide vector control. These systems can greatly reduce the irrigation needs of a project. Point values for these types of systems will be determined based upon design and engineering data documenting the water savings.	TBD	
Potable Water			
Showers	Water Efficient Showerheads (2.0 gpm)	3 points	
Toilets	Water Efficient Toilets (1.5 gpm)	3 points	
Faucets	Water Efficient faucets (1.28 gpm)	3 points	
Dishwasher	Water Efficient Dishwasher (6 gallons per cycle or less)	1	
Washing Machine	Water Efficient Washing Machine (Water factor <5.5)	1	
WaterSense	EPA WaterSense Certification	12 points	
Reduction Measure PS T1: Land Use Based Trips and VMT Reduction			
Mixed Use	Mixes of land uses that complement one another in a way that reduces the need for vehicle trips can greatly reduce GHG emissions. The point value of mixed use projects will be determined based upon a Transportation Impact Analysis (TIA) demonstrating trip reductions and/or reductions in vehicle miles traveled. Suggested ranges: Diversity of land uses complementing each other (2-28 points) Increased destination accessibility other than transit (1-18 points) Increased transit accessibility (1-25 points) Infill location that reduces vehicle trips or VMT beyond the measures described above (points TBD based on traffic data).	TBD	
Residential Near Local Retail (Residential only Projects)	Having residential developments within walking and biking distance of local retail helps to reduce vehicle trips and/or vehicle miles traveled. The point value of residential projects in close proximity to local retail will be determined based upon traffic studies that demonstrate trip reductions and/or reductions in vehicle miles traveled (VMT)	TBD	

Feature	Description	Assigned Point Values	Project Points
Other Trip Reduction Measures	Other trip or VMT reduction measures not listed above with TIA and/or other traffic data supporting the trip and/or VMT for the project.	TBD	
Reduction Measure PS T2: Bicycle Master Plan			
Bicycle Infrastructure	Ontario's Bicycle Master Plan is extensive and describes the construction on 11.5 miles of Class I bike paths and 23 miles of Class II and Class III bikeways to build upon the current 8 miles of bikeways. Provide bicycle paths within project boundaries. Provide bicycle path linkages between residential and other land uses. Provide bicycle path linkages between residential and transit.	TBD 2 points 5 points	
Reduction Measure PS T3: Neighborhood Electric Vehicle Infrastructure			
Electric Vehicle Recharging	Provide circuit and capacity in garages of residential units for use by an electric vehicle. Charging stations are for on-road electric vehicles legally able to drive on all roadways including Interstate Highways and freeways. Install electric vehicle charging stations in the garages of residential units	1 point 8 points	
Total Points Earned by Residential Project:			

Table 2: Screening Table for Implementation of GHG Reduction Measures for Commercial/Industrial Development

Feature	Description	Assigned Point Values	Project Points
Reduction Measure PS E3: Commercial/Industrial Energy Efficiency Development			
Building Envelope			
Insulation	2008 baseline (walls R-13; roof/attic R-30)	0 points	
	Modestly Enhanced Insulation (walls R-13, roof/attic R-38))	15 points	
	Enhanced Insulation (rigid wall insulation R-13, roof/attic R-38)	18 points	
	Greatly Enhanced Insulation (spray foam insulated walls R-15 or higher, roof/attic R-38 or higher) *(Applies to the conditioned space, defined as those areas within the building that have air conditioning and heating.)*	20 points	
Windows	2008 Baseline Windows (0.57 U-factor, 0.4 solar heat gain coefficient [SHGC])	0 points	
	Modestly Enhanced Window Insulation (0.4 U-factor, 0.32 SHGC)	7 points	
	Enhanced Window Insulation (0.32 U-factor, 0.25 SHGC)	8 points	
	Greatly Enhanced Window Insulation (0.28 or less U-factor, 0.22 or less SHGC) *(Applies to the conditioned space, defined as those areas within the building that have air conditioning and heating.)*	12 points	
Cool Roof	Modest Cool Roof (CRRC Rated 0.15 aged solar reflectance, 0.75 thermal emittance)	12 points	
	Enhanced Cool Roof (CRRC Rated 0.2 aged solar reflectance, 0.75 thermal emittance)	14 points	
	Greatly Enhanced Cool Roof (CRRC Rated 0.35 aged solar reflectance, 0.75 thermal emittance)	16 points	
Air Infiltration	Minimizing leaks in the building envelope is as important as the insulation properties of the building. Insulation does not work effectively if there is excess air leakage.		
	Air barrier applied to exterior walls, calking, and visual inspection such as the HERS Verified Quality Insulation Installation (QII or equivalent)	12 points	
	Blower Door HERS Verified Envelope Leakage or equivalent *(Applies to the conditioned space, defined as those areas within the building that have air conditioning and heating.)*	10 points	
Thermal Storage of Building	Thermal storage is a design characteristic that helps keep a constant temperature in the building. Common thermal storage devices include strategically placed water filled columns, water storage tanks, and thick masonry walls.		

Feature	Description	Assigned Point Values	Project Points
	Modest Thermal Mass (10% of floor or 10% of walls 12" or more thick exposed concrete or masonry with no permanently installed floor covering such as carpet, linoleum, wood or other insulating materials)	4 points	
	Enhanced Thermal Mass (20% of floor or 20% of walls 12" or more thick exposed concrete or masonry with no permanently installed floor covering such as carpet, linoleum, wood or other insulating materials)	6 points	
	Enhanced Thermal Mass (80% of floor or 80% of walls 12" or more thick exposed concrete or masonry with no permanently installed floor covering such as carpet, linoleum, wood or other insulating materials)	24 points	
Indoor Space Efficiencies			
Heating/ Cooling Distribution System	Minimum Duct Insulation (R-4.2 required)	0 points	
	Modest Duct Insulation (R-6)	8 points	
	Enhanced Duct Insulation (R-8)	10 points	
	Distribution loss reduction with inspection (HERS Verified Duct Leakage or equivalent)	14 points	
	(Applies to the conditioned space, defined as those areas within the building that have air conditioning and heating.)		
Space Heating/ Cooling Equipment	2008 Minimum HVAC Efficiency (EER 13/60% AFUE or 7.7 HSPF)	0 points	
	Improved Efficiency HVAC (EER 14/65% AFUE or 8 HSPF)	7 points	
	High Efficiency HVAC (EER 15/72% AFUE or 8.5 HSPF)	8 points	
	Very High Efficiency HVAC (EER 16/80% AFUE or 9 HSPF)	12 points	
	(Applies to the conditioned space, defined as those areas within the building that have air conditioning and heating.)		
Commercial Heat Recovery Systems	Heat recovery strategies employed with commercial laundry, cooking equipment, and other commercial heat sources for reuse in HVAC air intake or other appropriate heat recovery technology. Point values for these types of systems will be determined based upon design and engineering data documenting the energy savings.	TBD	
Water Heaters	2008 Minimum Efficiency (0.57 Energy Factor)	0 points	
	Improved Efficiency Water Heater (0.675 Energy Factor)	14 points	
	High Efficiency Water Heater (0.72 Energy Factor)	16 points	
	Very High Efficiency Water Heater (0.92 Energy Factor)	19 points	
	Solar Pre-heat System (0.2 Net Solar Fraction)	4 points	
	Enhanced Solar Pre-heat System (0.35 Net Solar Fraction)	8 points	
Daylighting	Daylighting is the ability of each room within the building to provide outside light during the day reducing the need for artificial lighting during daylight hours.		

Feature	Description	Assigned Point Values	Project Points
	All peripheral rooms within building have at least one window or skylight	1 points	
	All rooms within building have daylight (through use of windows, solar tubes, skylights, etc.)	5 points	
	All rooms daylighted	7 points	
Artificial Lighting	2008 Minimum (required)	0 points	
	Efficient Lights (25% of in-unit fixtures considered high efficacy. High efficacy is defined as 40 lumens/watt for 15 watt or less fixtures; 50 lumens/watt for 15-40 watt fixtures, 60 lumens/watt for fixtures >40watt)	9 points	
	High Efficiency Lights (50% of in-unit fixtures are high efficacy)	12 points	
	Very High Efficiency Lights (100% of in-unit fixtures are high efficacy)	14 points	
Appliances	Energy Star Commercial Refrigerator (new)	4 points	
	Energy Star Commercial Dish Washer (new)	4 points	
	Energy Star Commercial Cloths Washing	4 points	
Miscellaneous Commercial/Industrial Building Efficiencies			
Building Placement	North/South alignment of building or other building placement such that the orientation of the buildings optimizes conditions for natural heating, cooling, and lighting.	6 point	
Shading	At least 90% of south-facing glazing will be shaded by vegetation or overhangs at noon on June 21st.	6 Points	
Other	This allows innovation by the applicant to provide design features that increases the energy efficiency of the project not provided in the table. Note that engineering data will be required documenting the energy efficiency of innovative designs and point values given based upon the proven efficiency beyond Title 24 Energy Efficiency Standards.	TBD	
Existing Commercial building Retrofits	The applicant may wish to provide energy efficiency retrofit projects to existing commercial buildings to further the point value of their project. Retrofitting existing commercial buildings within the City is a key reduction measure that is needed to reach the reduction goal. The potential for an applicant to take advantage of this program will be decided on a case by case basis and must have the approval of the Ontario Planning Department. The decision to allow applicants the ability to participate in this program will be evaluated based upon, but not limited to the following:	TBD	

Feature	Description	Assigned Point Values	Project Points
	Will the energy efficiency retrofit project benefit low income or disadvantaged communities? Does the energy efficiency retrofit project fit within the overall assumptions in the reduction measure associated with commercial building energy efficiency retrofits? Does the energy efficiency retrofit project provide co-benefits important to the City? Point value will be determined based upon engineering and design criteria of the energy efficiency retrofit project.		
Reduction Measure PS E4: Commercial/Industrial Renewable Energy			
Photovoltaic	Solar Photovoltaic panels installed on commercial buildings or in collective arrangements within a commercial development such that the total power provided augments:		
	Solar Ready Roofs (sturdy roof and electric hookups)	2 points	
	10 percent of the power needs of the project	8 points	
	20 percent of the power needs of the project	14 points	
	30 percent of the power needs of the project	20 points	
	40 percent of the power needs of the project	26 points	
	50 percent of the power needs of the project	32 points	
	60 percent of the power needs of the project	38 points	
	70 percent of the power needs of the project	44 points	
	80 percent of the power needs of the project	50 points	
	90 percent of the power needs of the project	56 points	
	100 percent of the power needs of the project	60 points	
Wind turbines	Some areas of the City lend themselves to wind turbine applications. Analysis of the areas capability to support wind turbines should be evaluated prior to choosing this feature. Wind turbines as part of the commercial development such that the total power provided augments:		
	10 percent of the power needs of the project	8 points	
	20 percent of the power needs of the project	14 points	
	30 percent of the power needs of the project	20 points	
	40 percent of the power needs of the project	26 points	
	50 percent of the power needs of the project	32 points	
	60 percent of the power needs of the project	38 points	
	70 percent of the power needs of the project	44 points	

Feature	Description	Assigned Point Values	Project Points
	80 percent of the power needs of the project	50 points	
	90 percent of the power needs of the project	56 points	
	100 percent of the power needs of the project	60 points	
Off-site renewable energy project	The applicant may submit a proposal to supply an off-site renewable energy project such as renewable energy retrofits of existing commercial/industrial that will help implement reduction measures associated with existing buildings. These off-site renewable energy retrofit project proposals will be determined on a case by case basis accompanied by a detailed plan documenting the quantity of renewable energy the proposal will generate. Point values will be based upon the energy generated by the proposal.	TBD	
Other Renewable Energy Generation	The applicant may have innovative designs or unique site circumstances (such as geothermal) that allow the project to generate electricity from renewable energy not provided in the table. The ability to supply other renewable energy and the point values allowed will be decided based upon engineering data documenting the ability to generate electricity.	TBD	
Reduction Measure PS W2: Commercial/Industrial Water Conservation			
Irrigation and Landscaping			
Water Efficient Landscaping	Eliminate conventional turf from landscaping	0 points	
	Only moderate water using plants	3 points	
	Only low water using plants	4 points	
	Only California Native landscape that requires no or only supplemental irrigation	8 points	
Trees	Increase tree planting in parking areas 50% beyond City Code requirements	TBD	
Water Efficient irrigation systems	Low precipitation spray heads< .75"/hr or drip irrigation	1 point	
	Weather based irrigation control systems combined with drip irrigation (demonstrate 20 reduced water use)	5 points	
Recycled Water	Recycled water connection (purple pipe)to irrigation system on site	5 points	
Storm water Reuse Systems	Innovative on-site stormwater collection, filtration and reuse systems are being developed that provide supplemental irrigation water and provide vector control. These systems can greatly reduce the irrigation needs of a project. Point values for these types of systems will be determined based upon design and engineering data documenting the water savings.	TBD	

Feature	Description	Assigned Point Values	Project Points
Potable Water			
Showers	Water Efficient Showerheads (2.0 gpm)	3 points	
Toilets	Water Efficient Toilets/Urinals (1.5gpm) Waterless Urinals (note that commercial buildings having both waterless urinals and high efficiency toilets will have a combined point value of 6 points)	3 points 4 points	
Faucets	Water Efficient faucets (1.28gpm)	3 points	
Commercial Dishwashers	Water Efficient dishwashers (20% water savings)	4 points	
Commercial Laundry Washers	Water Efficient laundry (15% water savings) High Efficiency laundry Equipment that captures and reuses rinse water (30% water savings)	3 points 6 points	
Commercial Water Operations Program	Establish an operational program to reduce water loss from pools, water features, etc., by covering pools, adjusting fountain operational hours, and using water treatment to reduce draw down and replacement of water. Point values for these types of plans will be determined based upon design and engineering data documenting the water savings.	TBD	
Reduction Measure PS T1: Land Use Based Trips and VMT Reduction			
Mixed Use	Mixes of land uses that complement one another in a way that reduces the need for vehicle trips can greatly reduce GHG emissions. The point value of mixed use projects will be determined based upon traffic studies that demonstrate trip reductions and/or reductions in vehicle miles traveled	TBD	
Local Retail Near Residential (Commercial only Projects)	Having residential developments within walking and biking distance of local retail helps to reduce vehicle trips and/or vehicle miles traveled. The point value of residential projects in close proximity to local retail will be determined based upon traffic studies that demonstrate trip reductions and/or reductions in vehicle miles traveled	TBD	
Reduction Measure PS T2: Bicycle Master Plan			
Bicycle Infrastructure	Ontario's Bicycle Master Plan is extensive and describes the construction on 11.5 miles of Class I bike paths and 23 miles of Class II and Class III bikeways to build upon the current 8 miles of bikeways. Provide bicycle paths within project boundaries. Provide bicycle path linkages between project site and other land uses. Provide bicycle path linkages between project site and transit.	TBD TBD 2 points 5 points	

Feature	Description	Assigned Point Values	Project Points
Reduction Measure PS T3: Electric Vehicle Infrastructure			
Electric Vehicles	Provide public charging station for use by an electric vehicle. *(ten points for each charging station within the facility)*	10 points	
Reduction Measure PS T4: Employee Based Trip &VMT Reduction Policy			
Compressed Work Week	Reduce the number of days per week that employees need to be on site will reduce the number of vehicle trips associated with commercial/industrial development. Compressed work week such that full time employees are on site: 5 days per week 4 days per week on site 3 days per week on site	TBD	
Car/Vanpools	Car/vanpool program Car/vanpool program with preferred parking Car/vanpool with guaranteed ride home program Subsidized employee incentive car/vanpool program Combination of all the above	TBD	
Employee Bicycle/ Pedestrian Programs	Complete sidewalk to residential within ½ mile Complete bike path to residential within 3 miles Bike lockers and secure racks Showers and changing facilities Subsidized employee walk/bike program (Note combine all applicable points for total value)	TBD	
Shuttle/Transit Programs	Local transit within ¼ mile Light rail transit within ½ mile Shuttle service to light rail transit station Guaranteed ride home program Subsidized Transit passes Note combine all applicable points for total value	TBD	
CRT	Employer based Commute Trip Reduction (CRT). CRTs apply to commercial, offices, or industrial projects that include a reduction of vehicle trip or VMT goal using a variety of employee commutes trip reduction methods. The point value will be determined based upon a TIA that demonstrates the trip/VMT reductions. Suggested point ranges: Incentive based CRT Programs (1-8 points) Mandatory CRT programs (5-20 points)	TBD	
Other Trip Reductions	Other trip or VMT reduction measures not listed above with TIA and/or other traffic data supporting the trip and/or VMT for the project.	TBD	
Total Points from Commercial/Industrial Project:			

References

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California Air Pollution Control Officers Association (CAPCOA), Quantifying Greenhouse Gas Mitigation Measures, August 2010

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South Coast Air Quality Management District, Rules and Regulations, 2010

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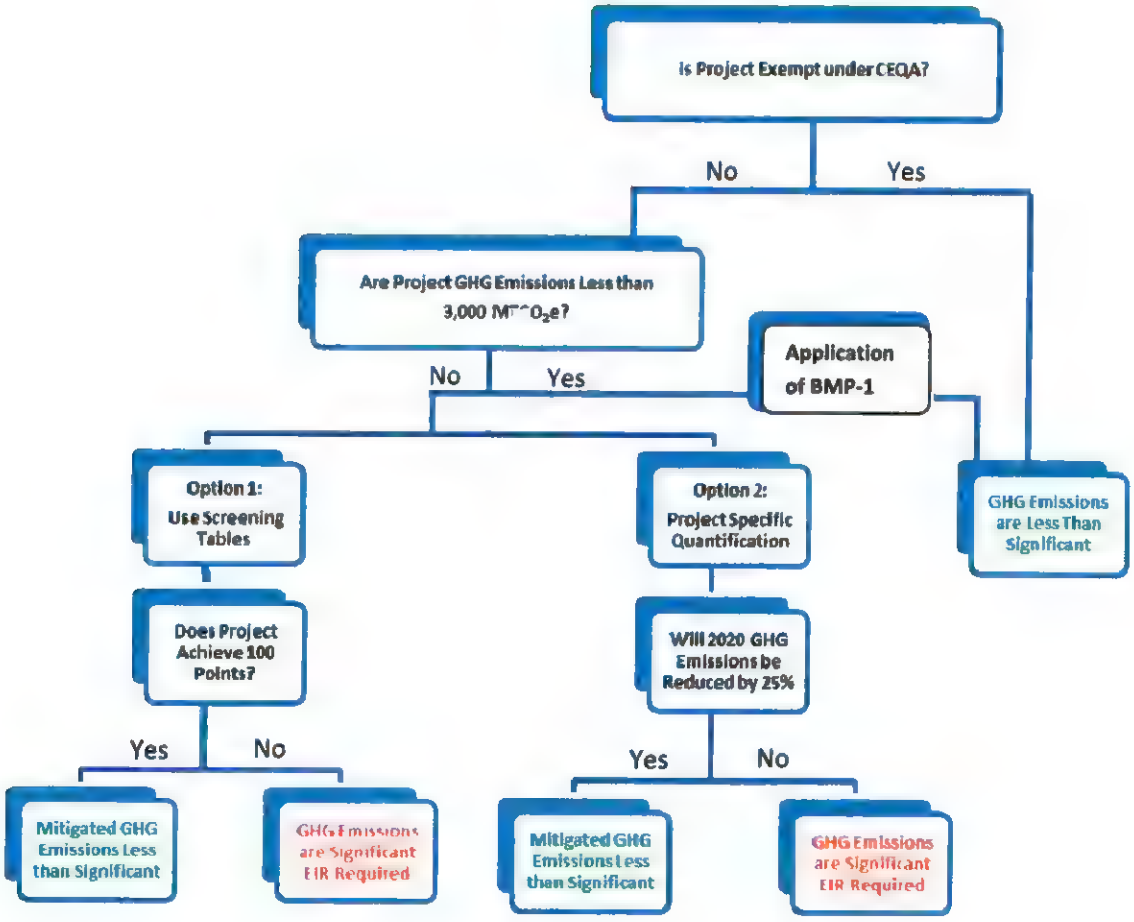
APPENDIX A: THE GHG DEVELOPMENT REVIEW PROCESS FLOW CHART DIAGRAM

Approach to Implementation of GHG Development Review



APPENDIX B: TRANSIT PRIORITY PROJECT AND SUSTAINABLE COMMUNITY PROJECT CHECKLIST

CITY OF ONTARIO TRANSIT PRIORITY PROJECT CHECKLIST

The following checklist will assist in determining if your Project qualifies as a Transit Priority Project (TPP) and a Sustainable Community Project (SCP) as defined in PRC 21155(a), (b), and PRC 21152.

Yes	No	Is the Project:	
☐	☐	1.	Located within ½ mile from the East Ontario Metrolink Station at 3330 East Francis Street, Ontario or the future Metrolink Station at 198 East Emporia Street, Ontario?
☐	☐	2.	At least 50% residential use based upon total square footage, and non-residential uses within the Project between 26% to 50% of total square footage with FAR of not less than 0.75?
☐	☐	3.	At or above a minimum net density of at least 20 dwelling units per acre?
☐	☐	4.	Is your project consistent with the general land use designations in the SCP (if you answered yes to questions 1 thru 3, then answer yes to this one)?

If you answered **Yes** to questions 1 through 4 then your Project is a Transit Priority Project (TPP) as defined by PRC Section 21155(b). Continue with the next list of environmental questions:

Yes	No	Does the Project:	
☐	☐	5.	Contain sites on the Cortese List?
☐	☐	6.	Site contain any hazardous substances, contaminated soil or hazardous material?
☐	☐	7.	Site include historical resources?
☐	☐	8.	Have an unusually high risk of fire or explosion from material stored or used at properties within ¼ mile of the Project site?
☐	☐	9.	Site currently developed as Open Space (parks, habitat, etc.)?

Continue with the next list of land use questions below:

Yes	No		
☐	☐	10.	Does the Project design have all the buildings at least 15% more efficient than Title 24 energy standards and uses 25% or less water than average households?
☐	☐	11.	Is the Project site eight acres or less in size?
☐	☐	12.	Does the Project not include any single level of a building exceeding 75TSF?
☐	☐	13.	Project does not conflict with nearby industrial uses?
☐	☐	14.	The Project will sell at least 20% of housing to families of moderate income, or 10% of housing will be rented to families of low income, or at least 5% of housing rented to families of very low income, or the Project provides open space equal or greater than 5 acres per 1,000 residents, or the developer will pay in-lieu fees sufficient to result in the development of affordable housing meeting one of the criteria described above?

Determining Eligibility based upon the answers:

Full CEQA Exemption for Sustainable Community Projects (SCPs)

If you answered **Yes** to all the TPP questions 1 through 4, **No** to all the environmental questions 5 through 9, and **Yes** to all the land use questions 10 through 14, then your Project is a SCP and is eligible for a full CEQA Exemption under SB 375.

Transit Priority Projects (TPP)

If you answered **Yes** to all the TPP questions 1 through 4, but did not qualify as a SCP then your project is a TPP. Your TPP also needs to incorporate all appropriate mitigation measures required by an applicable prior CEQA document (such as an adopted EIR for a Specific Plan) for your Project location. If your TPP meets these two criteria then your TPP does not need to analyze the following impacts in the Sustainable Communities Environmental Assessment (SCEA) or CEQA analysis:

- Growth inducing impacts,
- Regional transportation impacts, and
- GHG emissions related to passenger cars and light duty trucks.

The impacts listed above are considered less than significant because the Project is a TPP and the SCEA or CEQA document should reference PRC Section 21155.2(c)

Other Residential and Mixed Use Projects

If you answered Yes to question 4, but did not qualify as an SCP or TPP your project may not need to analyze some of the impacts in the CEQA analysis, if your project is a **residential project or mixed-use project with 75%** of the total building square footage of the Project as residential units. Also, your Project needs to incorporate all appropriate mitigation measures required by an applicable prior to CEQA document (such as an adopted EIR for a Specific Plan) for your Project location. If your project meets these criteria, then the CEQA analysis of your Project does not need to analyze the following Impacts:

- Growth inducing impacts,
- Regional transportation impacts, and
- GHG emissions related to passenger cars and light duty trucks.

The impacts listed above are considered less than significant because the Project meets the criteria in PRC Section 21155.2(c)

APPENDIX C:
LAND USE DEVELOPMENT TABLE

Sample Project Sizes by Land Use Category that are below 3000 MT CO2e

Project Type	Project Size that Generates 3000 Metric Tons of CO2e
Single Family Residential (Single Family Detached)	60units
Apartments/Condominiums/Townhouse	85units
Retirement Community (Senior Housing Age 50 or older)	100units
General Commercial/Retail/Office (refrigeration not to exceed 10% of total sf)	160,000 square feet
Supermarket/Grocery/Discount Club (refrigeration exceed10% of total sf)	36,000 square feet
Restaurants (sit down)	8,200 square feet
Fast-Food Restaurants (Fast Food with or without /Drive Thru)	5,300 square feet
Gas Station	7,200 square feet
Industrial	53,000 square feet
Wireless Communication Towers	2,400 kw
Passive Park	200 acres
Active Park	60 acres

*based upon statistical analysis of Projects run in the CalEEMod model.

* Definitions are provided below

Sample Project Sizes by Land Use Category that are below 3000 MT CO2e Definitions

Definitions:

Single Family Residential

Single-Family Detached homes on individual lots typical of a suburban subdivision.

Apartments/Condominiums/Townhouse

Apartments High Rise:	High-rise apartments are units located in rental buildings that have more than 10 levels and most likely have one or more elevators.
Apartments Low Rise:	Low-rise apartments are units located in rental buildings that have 1-2 levels.
Apartments Mid Rise:	Mid-rise apartments in rental buildings that have between 3 and 10 levels.
Condo/Townhouse:	These are ownership units that have at least one other owned unit within the same building structure.
Condo/Townhouse High Rise:	These are ownership units that have three or more levels.

Retirement Community Senior Housing (Age 50 or older)

These communities provide multiple elements of senior adult living. Housing options may include various combinations of senior adult housing single family and/or multi-family, in support of assisted living, and skilled nursing care aimed at allowing the residents to live in one community as their medical needs change.

General Commercial/Retail/Office (refrigeration not to exceed 10% of total sf)

Home Improvement Super Store, Auto Care Center, Electronic Superstore, Hardware store, Pharmacy/Drugstore with & without drive thru, General Office Building, Bank with & without drive thru, Gov. Civic Center, Gov. Office Building, Medical Office, Office Park, Health Club, and Strip Mall (small strip shopping centers contain a variety of retail shops and specialize in quality apparel, hard goods and services such as real estate offices, dance studios, florists and small restaurants) or Convenience Store not to exceed 5,000 sf.

Supermarket/Grocery/Discount Club (refrigeration exceed 10% of total sf)

Supermarkets: free-standing retail stores selling a complete assortment of food: food preparation and wrapping materials; and household, cleaning items. Supermarkets may also contain the following products and services: ATMs, automobile supplies, bakeries, books and magazines, dry cleaning, floral arrangements, greeting cards, limited-service banks, photo centers, pharmacies and video rental areas.

Discount Club: a discount or warehouse store where shoppers pay a membership fee in order to take advantage of discounted prices on a wide variety of items such as food, clothing, tires and appliances. Many items are sold in large quantities or in bulk.

Restaurants (sit down) Full-service eating establishments with typical turnover rates of at least one hour or longer. Patrons commonly wait to be seated, are served by a waiter, order from menus and pay for meals after they eat.
Fast-Food Restaurants (with or without /Drive Thru) Patrons generally order at a cash register and pay before they eat.
Gas Station Gas Station includes the building square footage and excludes the canopy. Gas/Service Stations Projects that include "One building" with two to three ancillary uses: Fast Food w/Drive Thru, Convenience Market 24hr.
Industrial Warehouse with or without refrigeration, storage, distribution, manufacturing, R&D with exception to those uses that require Title 5 Permit from AQMD (i.e. paint booths).
Wireless Communication Towers Cell Towers-freestanding
Passive Park Amenities that include tot lots, picnic table, non-programmed open space.
Active Park Amenities include one of the following: game fields lighted, pool facility and community center (as per the Comprehensive Park and Recreation Master Plan for Old Model Colony).

APPENDIX D: METHODOLOGY FOR THE DEVELOPMENT AND APPLICATION OF THE SCREENING TABLES

METHODS SUMMARY

The point values in the Screening Tables were derived from the projected emissions reductions that would be achieved by each of the reduction measures associated with new development within the CAP. The points within the Screening Tables were proportioned by residential unit or square feet of commercial/industrial uses. This was accomplished by taking the predicted growth in households and commercial uses in 2020 and proportioning the appropriate reduction quantities for new development to the residential, commercial, and industrial land use sectors within the Screening Table. The result is point values that are proportioned by residential unit or commercial/industrial square feet. Because of this, the size of the project is not relevant to the Screening Table. Regardless of size, each project needs to garnish 100 points to demonstrate consistency with the CAP. Efficiency, not size of the project, is critical. The following equations can be used in determining the amount of emissions reduced per point in the Screening Table:

For Residential Projects:

0.012 MT CO_2e per Point per Residential Unit

For Commercial and Industrial Projects:

0.007 MT CO_2e per Point per 1,000 Square Feet of gross Commercial/Industrial building area

Note that the Screening Table and point values are best used for typical development projects processed by the City. Examples of typical development projects include residential subdivisions, multi-family residential apartments, condominiums and townhouses, retail commercial, big box retail, office buildings, business parks, and typical warehousing. Mixed use projects can use the instructions at the beginning of the Screening Tables. Transit oriented development (TOD), and infill projects are able to use the Screening Tables, but the Screening Tables points are likely to underestimate total emission reductions afforded these types of projects. Note that the Screening Tables include the opportunity to custom develop points (using the formula above) in order to provide points in the sections of the Screening Tables marked TBD and account for the predicted reductions in vehicle trips and vehicle miles traveled within a project specific traffic study and GHG analysis. TOD and infill projects can be more accurately assessed and allocated points using this method.

However, more unusual types of industrial projects such as cement manufacturing, metal foundries, refrigerant manufacturing, electric generating stations—including large alternative energy electric generation, and oil refineries cannot use the Screening Tables because the emission sources for those types of uses were not contemplated in the tables.

DEVELOPMENT OF THE POINT VALUES

Within the City measures, 39,769 MT CO_2e will be reduced using the Performance Standard for new development. The Performance Standard is implemented through Screening Tables and the point allocation within the Screening Tables are tied to 39,769 MT CO_2e of reductions.

The first step in allocating point values is to determine the number of new homes and commercial buildings that are anticipated by year 2020. The City predicts that 16,489 new residential units will be needed by 2020 to accommodate the population growth by 2020 and a total of approximately 36,940,000 square feet of new commercial and industrial buildings within Ontario is needed to accommodate anticipated job growth. Of all new development anticipated by 2020, a total of approximately 1,649 new residential units and 3,694,000 square feet of new commercial and industrial buildings within Ontario are anticipated to be built as small projects using the efficiency measures. Approximately 14,840 new residential units and 33,246,000 square feet of new commercial and industrial buildings within Ontario are anticipated to either use the screening tables or provide an independent analysis demonstrating reductions. Evaluating the growth in residential and commercial/industrial land uses, approximately 44.55% is attributable to residential and 55.45% attributable to commercial/industrial land uses. Using those ratios, the Performance Standard will reduce 17,717 MT CO_2e from residential development and 22,052 MT CO_2e from commercial/industrial development by 2020.

Dividing the 17,717 MT CO_2e reductions of emissions afforded the Screening Table implementation of the Performance Standard for new residential development by the anticipated 14,840 new residential units that will be built yields 1.19 MT CO_2e per residential unit that needs to be reduced to fulfill the anticipated reductions of the CAP. That amount equals 100 points, producing the following equation for the point values:

0.012 MT CO_2e per Point per Residential Unit

A similar process was used to derive the point value for new commercial/industrial development:

0.007 MTCO2e per Point per 1,000 Sq. Ft. of gross Commercial/Industrial building area

The final step was to allocate points to each of the reduction measures in order to provide the menu of point values. Tables 1 and 2 below shows emission reductions afforded each measure. Note that emissions associated with new development are reduced by the State, as well as the City's Performance Standard. The Screening Tables focus on the Performance Standard the City is implementing associated with new development within the City boundaries. For this reason, the menu of options pertains to sectors of emissions associated with new development.

Table 1 Emissions Reduction By Measure

Reduction Number	Reduction Measure Name	Reduced Emissions(MT CO_2e) Commercial/Industrial	Residential
PS-T1	Land Use Based Trips and VMT Reductions	2,500	2,000
PS-T2	Bicycle Master Plan	2,000	1,601
PS-T3	Electric Vehicle Incentives and Infrastructure	2,116	1,714
PS-E1	Residential Energy Efficiency		7,087
PS-E2	Residential Renewable Energy Generation		4,784
PS-E3	Commercial/Industrial Energy Efficiency	8,821	
PS-E4	Commercial/Industrial Renewable Energy Generation	5,954	
PS-W1	Residential Water Conservation		531
PS-W2	Commercial/Industrial Water Conservation	661	
Total PS Reductions for New Development		**22,052**	**17,717**

Table 2 Measure Reduction By Project Size

Project Size	Reduced Emissions(MT CO_2e) Commercial/Industrial	Residential	ALL
BMP-1: (Projects at or below 3000 MT CO_2e)	772	619	1,391
PS-1 (Screening Tables)	22,052	17,717	**39,769**
Total Reductions for New Development from Local Measures	22,824	18,336	41,160

The CAP did not quantify emissions reductions associated with BMP-1 and assumed that new development would reduce 39,769 MT CO2e. However, calculations of anticipated reductions associated with BMP-1 were completed within this document and shown above. The overall reductions of both BMP-1 and PS-1 are anticipated to reduce a total of 41,160 MT CO2e. The predicted excess in reductions allows more certainty that the CAP will achieve the intended reduction goal for new development.

CITY OF ONTARIO

Community Climate Action Plan

Appendix C

Greenhouse Gas Reduction Measure Methods

Appendix C
Greenhouse Gas Reduction Measure Methods

C.1 Introduction

This Appendix provides a detailed overview of the calculations and assumptions used to quantify greenhouse gas (GHG) emissions reductions for each of the City of Ontario (the city) Community Climate Action Plan (CCAP) GHG reduction measures. A qualitative discussion of benefits is also presented. The following information is provided for each measure.

- **Measure Description**: Details the implementation requirement(s) and reduction goal for each measure.
- **Assumptions**: Includes all assumptions used in calculating emissions reductions.
- **Analysis Details**: Presents the methods for calculating 2020 business-as-usual (BAU) emissions[1], 2020 emissions with state measures and 2020 emissions with local measures. A qualitative summary of benefits is also provided. For additional information, please refer to the citations provided for each measure.

As an introduction to the measure details, this Appendix begins with an overview of the general GHG quantification methods by emissions sector.

C.2 Overview of GHG Methods

The quantification of GHG reductions was based on guidance provided by the California Air Pollution Control Officers Association (CAPCOA), other reference sources (such as the U.S. Environmental Protection Agency), and professional experience obtained from preparing climate action plans (CAP) for other jurisdictions in California. The majority of calculations were performed using standard factors and references, rather than performing a specific analysis of individual technologies. The following sections provide an overview of general calculation methods by emissions sector.

To avoid double counting emissions savings achieved by state programs, emissions reductions attributed to the local City measures subtract reductions achieved through the relevant state measures first. Likewise, emissions reductions attributed to certain local City measures subtract reductions achieved by overlapping local measures. By removing overlapping reductions, one can combine GHG reduction strategies to determine the cumulative effect of several measures without double counting measure effectiveness.

Some measures were not quantified due to insufficient data needed to quantify GHG reductions. This appendix describes the methods used to quantify GHG reductions for state and local measures. Unquantified measures are not included in this appendix. The table below presents a summary of quantified and unquantified measures.

Measure Number	Measure Name	Quantified/ Unquantified
State		
State-1	Title 24 Standards for Residential and Non-Residential Buildings (CALGreen)	Quantified
State-2	AB 1109 (Huffman) Lighting Efficiency and Toxics Reduction Act	Quantified

[1] BAU emissions are defined as those that would occur without the implementation of state (e.g., renewable energy portfolio, Title 24) or local action (e.g., Energy-1, Energy-2).

Measure Number	Measure Name	Quantified/ Unquantified
State-3	AB 1470 (Huffman)	Quantified
State-4	Industrial Boiler Efficiency	Quantified
State-5	Statewide Renewable Portfolio Standard (RPS)	Quantified
State-6	AB 1493 Pavley I and II and Low Carbon Fuel Standard (LCFS)	Quantified
State-7	AB 32 Transportation Reduction Strategies	Quantified
State-8	Sustainable Communities Strategy/Regional Blueprint Planning	Quantified
State-9	Low Carbon Fuel Standard (LCFS)	Quantified
County		
County-1	San Bernardino County Landfill Methane Capture Systems	Quantified
GHG Performance Standard		
PS-1	Performance Standard for New Development	Quantified
BMP-1	Performance Standard for New Development: BMP-1: Exceed Title 24 Energy-Efficiency Standards for New Buildings by 5% by 2020	Quantified
Building Energy		
Muni-1 [a]	Municipal Energy Measures	Quantified
Energy-1	CAP Consistency	Not Quantified
Energy-2	Regional Cooperation	Not Quantified
Energy-3	Energy Efficiency Funding for Existing Low-Income Residents	Quantified
Energy-4	Energy Efficiency Incentives and Programs to Promote Retrofits for Existing Residential Buildings	Quantified
Energy-5	Energy Efficiency Incentives and Programs to Promote Retrofits for Existing Non-Residential Buildings	Quantified
Energy-6	Streetlights	Quantified

Measure Number	Measure Name	Quantified/ Unquantified
Renewable Energy		
Muni-2 [a]	Municipal Renewable Energy Measures	Quantified
Renewable Energy-1	Solar Installation for Existing Non-Residential for Major Rehabilitations or Expansion	Quantified
Renewable Energy-2	Solar Installation in Existing Single Family Housing	Quantified
Renewable Energy-3	Solar Installation in Existing Nonresidential Buildings	Quantified
Wastewater Treatment		
Wastewater-1	Recycled Water	Not Quantified
Wastewater-2	Waste-to-energy/Methane Recovery	Not Quantified
Solid Waste Management		
Waste-1	Waste Diversion	Quantified
Waste-2	Construction and Demolition Waste Recovery Ordinance	Not Quantified
On-Road Transportation		
Muni-3 [a]	Municipal Transportation Measures	Quantified
Trans-1	Expand Public Transportation Infrastructure	Not Quantified
Trans-2	Transit Frequency and Speed	Not Quantified
Trans-3	"Smart Bus" Technology	Quantified
Trans-4	Expand Public Transportation Participation	Not Quantified
Trans-5	Low- and Zero-Emission Vehicles	Not Quantified
Trans-6	Vehicle Idling	Quantified
Trans-7	Parking Policy	Not Quantified
Trans-8	Event Parking	Not Quantified
Trans-9	Roadway Management	Not Quantified
Trans-10	Signal Synchronization	Not Quantified
Trans-11	School Transit Plan	Not Quantified
Trans-12	Ridesharing Programs	Not Quantified
Trans-13	Bicycle and Pedestrian Infrastructure Plan	Not Quantified
Trans-14	Development Standards for Bicycles	Not Quantified
Trans-15	Smart Growth and Infill	Not Quantified
Trans-16	Transit-Oriented Development	Not Quantified
Off-Road Equipment		
Muni-4 [a]	Municipal Off Road Measures	Quantified
Off Road-1	Idling Ordinance	Quantified
Off Road-2	Landscaping Equipment	Quantified
Agriculture		
Agriculture-1	Methane Emissions Reduction for Animal Operations	Quantified

Measure Number	Measure Name	Quantified/ Unquantified
Water Transport, Distribution, and Treatment		
Muni-5 [a]	Municipal Water Measures	Not Quantified
Water-1	Water Conservation for Existing Buildings	Quantified
Water-2	Outdoor Irrigation Monitoring and Management System	Quantified
Water-3	Water System Efficiency	Not Quantified
Water-4	SB X7-7	Quantified
Miscellaneous		
Misc-1	Climate Change Awareness	Not Quantified
Misc-2	Carbon Sequestration	Not Quantified
Misc-3	Shade Tree Planting	Quantified
Misc-4	Refrigeration and Air Conditioning Disposal	Not Quantified
Misc-5	Pervious Paving	Not Quantified
Misc-6	Infiltration	Not Quantified

Notes:

[a] All MCAP measures are quantified and explained in the City of Ontario Municipal Climate Action Plan. They are not included in this appendix.

C.2.1 State Measures

The CCAP includes emissions benefits from eight statewide initiatives. These State measures span multiple emission sectors, but are primarily targeted at the building energy and transportation sectors. Emissions reductions achieved by these measures were apportioned to the city-level using statewide estimates of measure effectiveness and sector-specific information. For example, the California Air Resources Board (CARB) estimates that implementation of Assembly Bill 1109 will reduce indoor residential lighting by at least 50% and reduce indoor commercial and outdoor lighting by at least 25% by 2018 (compared to 2007). GHG reductions achieved by Assembly Bill 1109 within Ontario was therefore quantified by multiplying 2020 BAU emissions from residential lighting and commercial lighting by 50% and 25%, respectively. It is important to note that while Ontario will achieve emissions reductions as a result of State programs, implementation of State measures does not necessarily always require local action. For example, state measures concerning the RPS, LCFS, or vehicle efficiency (Pavley/Advanced Clean Cars) don't require local action to be effective. However, some state measures (such as Title 24 building efficiency requirements or Sustainable Community Strategy local land use planning) require local implementation.

C.2.2 San Bernardino County Measures

The County of San Bernardino plans to install methane capture systems at a number of county-owned and operated landfills. Since these landfills serve Ontario, the city would see emission reductions from their solid waste management sector, as fewer fugitive methane emissions from the decomposition of city-generate waste would be released into the atmosphere.

C.2.3 Local Measures

The section summarizes local efforts that the CCAP proposes to further reduce community-wide GHG emissions. Measures that are required by State law, such as compliance with Assembly Bill 1109, or city regulations, such as an Idling Ordinance, would be mandatory for either existing and/or new development (and are identified with a [M]). The City of Ontario would require implementation of these measures, pursuant to state and new or existing local laws and regulations. Measures that would be implemented through incentive-based approaches, such as building retrofits, would be voluntary and are marked with a [V]. GHG reductions associated with these voluntary measures were quantified based on anticipated participation rates. Measures that would be implemented by the city for

municipal measures are marked with a [CITY] mark. Some measures are a combination of city measures and voluntary or mandatory measures.

GHG Performance Standard for New Development

The GHG Performance Standard for New Development (PS) provides a streamlined and flexible program for new projects to reduce their emissions. This approach uses a performance standard for new private developments as part of the discretionary approval process under CEQA. New projects would be required to quantify project-generated GHG emissions and adopt feasible reduction measures to reduce project emissions to 25% below BAU project emissions. This approach does not require project applicants implement a pre-determined set of measures. Rather, project applicants are encouraged to choose the most appropriate measures for achieving the reduction goal, while taking into consideration cost, environmental or economic benefits, schedule, and other project requirements. The PS applies to all projects emitting more than 3,000 MT CO_2e per year, which is roughly equivalent to 90% of projects. Projects emitting less than this amount must implement a suite of BMPs. In order to quantify the reductions achieved for the PS approach, the amount of new development emissions from 2012 to 2020 was estimated for the city along with the GHG reductions needed to achieve the overall PS reduction goal for the city. Then the value of the other state and local measures for new development was estimated for the city and subtracted from the PS reduction goal to derive the net additional reductions that would result from the PS implementation. This does not mean that the state and local other measures would apply on an equal basis for every single project, and thus individual new development projects may have higher or lower project-level burdens than the average. Analysis of this measure indicates that the bulk of reductions needed to meet the PS would be from other state and local measures and a smaller portion from project-level reductions.

Building Energy

Reduction measures to address GHG emissions from building energy use are separated into two categories: energy efficiency and renewable energy. Emissions reductions associated with these measures were quantified using estimates of electricity kilowatt hour (kWh) and natural gas (therms) consumed by residential, commercial, and industrial buildings. Activity data was provided for the existing inventory year (2008), which was scaled to 2020 under BAU conditions using the socioeconomic data summarized in Appendix A, *City of Ontario 2008 Community Greenhouse Gas Emissions Inventory and 2020 Forecast.*

Emissions reductions achieved by energy efficiency and renewable energy measures were quantified using a general standards and factors. Specifically, percent reductions in energy consumption for various actions, such as exceeding the Title 24 Standard, were obtained from CAPCOA and other literature sources. These reductions were applied to the expected 2020 energy usage to quantify total reductions in energy consumption. GHG emissions that would have been emitted had the energy been consumed were then calculated using utility-specific emission factors.

Wastewater Treatment

The CCAP includes two wastewater measures; one to reduce the need for freshwater through the use of recycled water and one to capture methane produced during the wastewater treatment process.

GHG savings from methane capture were calculated assuming the majority of methane generated by wastewater treatment plants is captured and not released into the atmosphere. Emission reductions from the increased use of recycled water are based on the reduced energy intensity associated with producing recycled water, compared to conveying water to southern California from the State Water Project.

Solid Waste Management

The waste reduction strategy aims to reduce the amount of waste produced by the city. Existing waste generation volumes and diversion rates were obtained from CalRecycle (2010a). GHG emissions that would have been generated by waste if they had not been diverted were quantified using the CARB First Order Decay (FOD) model and the methods described in Appendix A.

On-Road Transportation

Measures within the on-road transportation sector seek to both reduce the number of vehicle trips, as well as encourage mode shifts from single occupancy vehicles to alternative transportation. There are three local community transportation measures that were quantified in the CCAP; SB 375, Smart Bus, and vehicle idling. The effect of SB 375 on transportation emissions by 2035 in the county was quantified by the Southern California Associated Governments (SCAG) using their regional transportation demand model. These county-wide reductions were scaled to 2020 and to Ontario. SB 375 also includes transportation-related GHG reductions from The Ontario Plan (TOP) which occur throughout the SCAG region. Smart Bus reductions were estimated using data on average weekday and annual ridership, vehicle miles, and passenger miles from Omnitrans along with standard transportation emission factors. Vehicle idling emission reductions were estimated using data on average idling fuel consumption rates from the U.S. Environmental Protection Agency (USEPA), ARB, and other sources.

Off-Road Equipment

Measures within the off-road equipment sector seek to increase the use of electricity and reduce the consumption of fossil fuels in heavy-duty off-road equipment. GHG emissions in 2020 for off-road activity within the city were quantified using the CARB OFFROAD2007 emissions model. OFFROAD2007 provides detailed estimates of fuel consumption, hours of operation, and emissions by equipment type and horsepower. GHG emissions associated with electrifying portions of the off-road vehicle fleet were determined by multiplying the model outputs by the anticipated emission reductions estimated by CAPCOA (2010). GHG reductions from vehicle idling restrictions were also quantified using OFFROAD2007 and standard fuel consumption factors.

Agriculture

The voluntary measure within the agriculture sector supports the reduction of methane emissions from manure management and enteric fermentation. This measure applies to the dairy industry and other animal operations. GHG emissions reductions associated with methane reduction at dairies and other animal operations were determined by multiplying BAU methane emissions by the number of participating dairies (estimated using date from the Climate Change Scoping Plan for *Measure A-1: Methane Capture at Large Dairies*) and the altered methane emissions rate under this measure.

Water Transport, Distribution, and Treatment

The CCAP seeks to reduce energy and GHG emissions associated with water consumption through adoption of the voluntary CALGreen water efficiency measures for existing and new development and encourage water-efficient landscaping practices in the participating cities. Fixture flow rates from CALGreen (2010) and CAPCOA (2010) along with socioeconomic data were used to estimate the water savings from CALGreen standards. Information from CAPCOA was used to estimate the water savings from water-efficient landscaping practices. Indirect GHG emissions from electricity required to pump, treat, distribute and/or heat the consumed water were calculated using state-specific emission factors.

Miscellaneous

The CCAP includes a measure to expand urban forestry programs to 1,000 new trees per year. Emissions benefits from increased shade were quantified based on information provided by ICLEI and CAPCOA. Regional tree planting lists were consulted to determine the types of tree species appropriate for planting along city streets and in open spaces. It was assumed that tree planting began in 2012 and will continue to occur on an annual basis. Reductions for this measure are included in the building energy sector, as shade trees reduce the energy consumption in buildings. There are a number of other miscellaneous measures that were included in the CCAP but were not quantified.

C.3 Overview of Measure Benefits

Many of the GHG reduction measures would result in financial, environmental, and public benefits for Ontario and communities that are additional to the expected GHG emission reductions. These benefits include cost savings over conventional activities, reductions in criteria pollutants, job growth, economic growth, and public health improvements. Studies have shown that climate action in California can produce net gains for the statewide economy, increasing growth and creating jobs (Roland-Host 2008). Climate policies can produce positive economic growth through monetary savings from improvements in energy efficiency and reduced energy bills, as well as investing in technologies for innovation, which can provide new stimulus for employment (Roland-Host 2008). Addressing and mitigating GHG emissions on a national level can yield a large savings potential, benefit the global economy, and can be mostly achieved through implementation of existing technology (Roland-Host 2008). Based on literature reviews, a qualitative discussion of anticipated benefits is provided for the city's GHG reduction measures. Benefits are identified using the following icons.

Benefits for the CCAP GHG Reduction Measures

C.4 GHG Quantification Methods

The following section provides GHG quantification details for the CCAP measures for each sector. For each measure, the following information is presented:

1. Measure Description
2. Assumptions
3. Analysis Details – GHG Analysis
4. Analysis Details – Co-Benefit Analysis

State-1: Title 24 Standards for Non-Residential and Residential Buildings (Energy Efficiency Standards and CALGreen)

Measure Description

Requires that building shells and building components be designed to conserve energy and water. 2008 T24 standards were effective starting January 1, 2009, and 2013 T24 standards were effective starting January 1, 2014. The standards are assumed to be periodically updated between 2014 and 2020.

Assumptions

Quantification of this measure employs the following assumptions:

- The 2013 Title 24 standards are 25% and 14% more stringent than the 2008 T24 standards for single-family homes and multi-family homes, respectively (California Energy Commission 2012). This is equivalent to an increase in stringency of approximately 21% on average for all residential buildings the county as a whole.
- The 2013 Title 24 standards are 30% more stringent than the 2008 T24 standards for nonresidential buildings (California Energy Commission 2012).
- Stringency of the residential Title 24 standards will be increased by 17% every three years starting in 2017 (Maziar pers. comm.)
- Stringency of the nonresidential Title 24 standards will be increased by 7% every three years starting in 2017 (Maziar pers. comm.)

Analysis Details

GHG Analysis

Energy efficiency upgrades as a result of the Title 24 standards will reduce electricity and natural gas consumption, thereby resulting in GHG emissions savings.

2020 BAU Energy Consumption

The GHG Inventory (Appendix A) estimates that community-wide electricity consumption in 2020 for the participating cities is approximately 2,154 MWh and community-wide natural gas consumption in 2020 for the participating cities is approximately 110 million therms.

Emissions Reductions

The stringency of the Title 24 Standards will be increased three times relative to the GHG inventory base year (2008) by 2020.[2] The 2013 standards represent a 21% and 30% increase in energy efficiency (electricity and natural gas) compared to the 2008 T24 standards for residential and non-residential buildings, respectively. Assuming a 17% and 7% tri-annual increase in the stringency of the residential and non-residential Title 24 standards, respectively, after 2014, 2020 residential energy use would be reduced to 54.8% of the 2008 code.[3] Non-residential energy use would likewise be reduced to 60.5% of the 2008 code. However, because the Title 24 code is revised on a semi tri-annual basis, only a fraction of total energy use is subject to each code revision. To avoid-double counting, estimated energy reductions were multiplied by the annual fraction of electricity subject to each code revision. The average reduction in residential energy use in 2020 as a result of the Title 24 Standards was therefore estimated to be 17.4% (82.6% of the 2008 code), and the average non-residential reductions were estimated to be 19.5% (80.5% of the 2008 code).

Energy reductions achieved by Title 24 were calculated by multiplying 17.4% and 19.5% by the city's 2020 BAU electricity and natural gas consumption for residential and non-residential development, respectively. GHG emissions reductions were quantified by multiplying the total energy reductions by the appropriate SCE emission factors.[4]

[2] Increases assumed in 2014, 2017, and 2020.
[3] Assumes 100% in 2005 and a 17% reduction every three years beginning in 2008.
[4] SCE emission factors account for decreased carbon intensities as a result of the State's RPS.

Co-Benefit Analysis

The following benefits are expected from implementation of improvement of the Title 24 standards over time.

 **Reduced Energy Use:** Energy retrofits and standards would improve the efficiency of residential and non-residential buildings. As such, the amount of energy (e.g., electricity, natural gas) consumed per unit of activity would be lowered.

 **Reduced Air Pollution:** Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity) and local air pollution (from reduced burning of natural gas).

 **Resource Conservation:** Increased building efficiency would reduce water consumption, which would help conserve freshwater.

 **Increased Property Values**: Energy-efficient bulidings have higher property values and resale prices than less efficient buildings.

 **Public Health Improvements**: Reduced regional and local air pollution would contribute to overall improvements in public health. A well-built, energy-efficient structure is also more durable and directly reduces certain health aliments. For example, properly sealed ducts help prevent mold and dust mites that can cause asthma.

 **Increased Quality of Life**: The reduction of health aliments (see above) contributes to increased quality of life. Additionally, energy-efficient structures improve general comfort by equalizing room temperatures and reducing indoor humidity.

State-2: AB 1109 (Huffman) Lighting Efficiency and Toxics Reduction Act

Measure Description

Structured to reduce statewide electricity consumption in the following ways: 1) At least 50% reduction from 2007 levels for indoor residential lighting, and 2) At least 25% reduction from 2007 levels for indoor commercial and outdoor lighting, by 2018.

Assumptions

Quantification of this measure employs the following assumptions:

- Approximately 6.2% of electricity is used for commercial outdoor lighting (California Energy Commission 2006, Table 10-3).
- Approximately 29% of electricity is used for commercial indoor lighting (California Energy Commission 2006, Table 10-3).
- Approximately 39% of electricity is used for "other appliances and lighting" in residences in San Bernardino County based on climate zone (Energy Information Administration 2009, Table AP5).
- Of electricity is used for "other appliances and lighting," 50% is used for lighting (estimate); this means that approximately 20% of total residential electricity use is for lighting (39% * 50%).
- This measure results in a reduction of 50% for electricity used for indoor residential lighting and a reduction of 25% for electricity used for indoor commercial and outdoor lighting.

Analysis Details

GHG Analysis

Lighting requires the production of electricity to power the lights, which represents an indirect source of GHG emissions. Different light fixtures have different efficacies; in other words, certain bulbs can utilize less energy to obtain the same output. Replacing less efficient bulbs with energy-efficient ones therefore reduces energy consumption, and thus GHG emissions.

2020 BAU Lighting Electricity Consumption

Electricity usage from outdoor lighting in commercial developments within the city was estimated by multiplying the total anticipated energy use in 2020 under BAU conditions by 6.2% (California Energy Commission 2006, Table 10-3). Electricity usage from indoor lighting in residential and commercial developments within the city was estimated by multiplying the total anticipated energy use in 2020 under BAU conditions by 20% and 29%, respectively (California Energy Commission 2006, Table 10-3; Energy Information Administration 2009, Table AP5).

Emissions Reductions

AB 1109 will reduce indoor residential lighting by at least 50%. Energy reductions within the residential sector were calculated by multiplying the BAU indoor energy consumption for residential lighting by 0.50. AB1109 will reduce both outdoor and indoor commercial lighting by at least 25%. Energy reductions within the commercial sector were calculated by multiplying the BAU energy consumption for commercial lighting by 0.25. GHG emissions reductions were then quantified by multiplying the total energy reductions by the appropriate utility emission factors.

Co-Benefit Analysis

The following benefits are expected from implementation of AB1109.

Reduced Energy Use: Energy-efficient lighting (e.g., compact fluorescent lamps [CFL]) consumes, on average, 75% less electricity than incandescent bulbs.

Reduced Air Pollution: Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).

Increased Property Values: Energy-efficient bulidings have higher property values and resale prices than less efficient buildings.

Increased Quality of Life: CFLs have a much longer lifetime than incandescent bulbs, resulting in reduced bulb turn-over and the need to purchase new fixtures.

State-3: AB 1470 (Huffman) Solar Water Heaters

Measure Description

Creates a $25 million per year, 10-year incentive program to encourage the installation of solar water heating systems that offset natural gas use in homes and businesses throughout the state.

Assumptions

Quantification of this measure employs the following assumptions:

- Solar water heaters reduce natural gas use by 130 therms (California Air Resources Board 2008a).
- An average of 0.013 water heaters per home will be replaced as a result of AB 1470 (California Air Resources Board 2008a; California Department of Finance 2000).

Analysis Details

GHG Analysis

California relies heavily on natural gas for water heating. Rooftop solar water heating technologies are designed to reduce fuel consumption, and thus GHG emissions. It is estimated that by creating a mainstream market, California can save more than 1 billion therms of natural gas per year—24% of the state's residential natural gas usage. (Huffman et. al. 2007)

Emissions Reductions

CARB estimates that implementation of AB 1470 would result in the installation of 200,000 solar water heaters by 2020. Assuming that an average of 0.013 heaters per home would be replaced as a result of AB 1470, and that the participating cities would have 520,241 single- and multifamily homes in 2020 (Southern California Association of Governments 2012a), a total of 6,503 water heaters would be replaced with solar water heaters. Each solar water heater will reduce natural gas use by 130 therms (California Air Resources Board 2008a). Natural gas reductions were therefore calculated by multiplying 130 therms by 6,503. GHG emissions reductions were then quantified by multiplying the total energy reductions by the appropriate utility emission factors.

Co-Benefit Analysis

The following benefits are expected from implementation of AB 1470.

Reduced Energy Use: Solar water heaters consume, on average, 130 therms less natural gas than non-solar units.

Reduced Air Pollution: Reduced energy use would contribute to corresponding reductions in local air pollution (from reduced burning of natural gas).

Increased Property Values: Energy-efficient buildings have higher property values and resale prices than less efficient buildings.

State-4: Industrial Boiler Efficiency

Measure Description

This measure evaluated by ARB would require one or more of the following: annual tuning of all boilers, the installation of an oxygen trim system, and/or a non-condensing economizer to maximize boiler efficiency. A source could also replace an existing boiler with a new one that is equipped with these systems.

Assumptions

The following assumptions were considered in the evaluation of this measure:

- Because separate industrial natural gas emissions data were not available for Ontario, the statewide ratio of commercial to industrial natural gas emissions was used to estimate industrial natural gas emissions. This value is 66% (California Air Resources Board 2008b).
- 80% of all industrial natural gas emissions in the State are affected by this measure (California Air Resources Board 2008a); the same percent effectiveness rate was used for the Partnership cities.
- The Industrial Boiler Efficiency measure will reduce emissions by 5% (California Air Resources Board 2008a); the same percent reduction was used for Ontario.

Analysis Details

GHG Analysis

Newer, more efficient industrial boilers consume less natural gas, thereby reducing GHG emissions from natural gas combustion.

2020 BAU Emissions

The GHG Inventory quantified emissions associated with commercial and industrial natural gas use in 2020 under BAU conditions. Because the Industrial Boiler Efficiency measure only applies to industrial natural gas use, 2020 BAU emissions from commercial and industrial natural gas use were quantified by multiplying BAU emissions from this sector by 0.66.[5]

Emissions Reductions

CARB estimates that implementation of the Industrial Boiler Efficiency measure will reduce statewide emissions from industrial natural gas use by 4% (80% penetration multiplied by a 5% reduction) (California Air Resources Board 2008a). Since statewide emissions from industrial natural gas use account for 66% of total emissions from industrial and commercial natural gas use combined (California Air Resources Board 2008b), the net reduction in statewide industrial and commercial natural gas use emissions is 2.6% (4% multiplied by 66%).

GHG reductions achieved by the Industrial Boiler Efficiency measure within Ontario were therefore quantified by multiplying 2020 BAU emissions from commercial plus industrial natural gas consumption by 0.026.

Co-Benefit Analysis

The following benefits are expected from implementation of the Industrial Boiler Efficiency Measure.

Reduced Energy Use: Newer, more efficient industrial boilers consume less natural gas. As such, the amount of energy (e.g., natural gas) consumed per unit of activity would be lowered.

Reduced Air Pollution: Reduced energy use would contribute to reductions in local air pollution (from reduced burning of natural gas).

[5] Value based on 38.41 $MMTCO_2e$ for statewide emissions in 2020 from natural gas use in the commercial and industrial sectors combined, with 25.4 $MMTCO_2e$ due to industrial natural gas use (California Air Resources Board 2008b)

Increased Property Values: Buildings with newer, more efficient boilers will likely have higher property values and resale prices than buildings with older, less efficient boilers.

Public Health Improvements: Reduced local air pollution would contribute to overall improvements in public health.

Increased Quality of Life: The reduction of health aliments (see above) contributes to increased quality of life.

State-5: Senate Bill 1078 (2002)/Senate Bill 107 (2006) and Senate Bill 2 (2011) Renewable Portfolio Standard

Measure Description

Obligates investor-owned utilities (IOUs), energy service providers (ESPs), and Community Choice Aggregations (CCAs) to procure 20% of retail sales from eligible renewable sources by 2013, 25% by 2016. SB 2 (2011) and EO S-14-08 also sets forth a longer range target of procuring 33% of retail sales by 2020.

Assumptions

Quantification of this measure employs the following assumptions:

- The 2020 BAU renewable energy mix for Southern California Edison (SCE) is 13.8% (California Energy Commission 2009)each utility is as follows:

Analysis Details

GHG Analysis

Implementation of the Renewable Portfolio Standard (RPS) will increase the proportion of renewable energy within the energy supply mix of the utility serving the city. Renewable resources, such as wind and solar power, produce the same amount of energy as coal and other traditional sources, but do not emit any GHGs. By generating a greater amount of energy through renewable resources, electricity provided to the city by SCE will be cleaner and less GHG intensive.

2020 BAU Emissions

The GHG Inventory (Appendix A) estimates that community-wide electricity consumption[6] in 2020 for the city would be approximately 2,154 megawatt hours (MWh). The 2020 BAU renewable energy mix for SCE was determined using the direct renewable percentage for 2008 from the CEC's Utility Energy Supply Plans.

Emissions Reductions

Based on the renewable energy mix assumptions listed above, achievement of the RPS will reduce the carbon intensity of the 2020 CO_2 emission factor for SCE from 631 pounds per MWh to 490 pounds per MWh for SCE (The Climate Registry 2009; California Energy Commission 2009).

Similar reductions will be achieved by the statewide CH_4 and N_2O emission factors as reported by the U.S. EPA (U.S. Environmental Protection Agency 2010). GHG emissions that would be generated by community-wide electricity consumption in 2020 will therefore be lower as a result of the RPS-adjusted emission factors.

GHG emissions generated from electricity consumption were calculated assuming implementation of the RPS by multiplying 2020 community-wide electricity consumption by the RPS-adjusted emissions factors. The difference in emissions between the 2020 BAU and 2020 RPS scenarios represents the emissions reductions achieved by this measure.

Co-Benefit Analysis

The RPS provides California with a flexible, market-based strategy to increase renewable energy generation and distribution. As discussed above, renewable energy provides the same amount of power as tradition sources (e.g., coal), but does not emit any GHGs or other criteria pollutants. Renewable energy therefore represents a clean source of power for the State and the participating cities. The following benefits are expected from implementation of the RPS (International Energy Agency 2007; U.S. Environmental Protection Agency 2009a).

Reduced Air Pollution: SCE generates power through a combination of sources, but the majority of electricity is provided by fossil fuels (e.g., coal, natural gas). The extraction and processing of fossil fuels generates localized pollutants emissions at the place of mining and at the source of power generation. These pollutants may be dispersed into the atmosphere, where they can be transported over long distances and result in regional air pollution. Reducing the amount of fossil fuels processed at power stations through increased generation of renewable energy would contribute to

[6] Includes electricity consumed by buildings.

cumulative reductions in criteria pollutants throughout the State.

Waste Reduction: The generation of electricity from fossil fuels (e.g., coal, natural gas) generates a substantial amount of waste including, but not limited to: fly ash, bottom ash, flue gas, and sludge. These products can have detrimental effects on the environment if absorbed into groundwater, soil, and/or biota. The extraction and mining of fossil fuels also generates waste. Increasing renewable energy production would reduce waste created by fossil fuel supplied power.

Energy Diversity and Security: Fuels that are traded in the open market are subject to energy supply constraints and interruptions from political unrest, conflict, and trade embargoes. Centralized power structures (e.g., stations, substations, refineries, ports) may also be targets of energy terrorism. Providing a diversified and domestic energy supply reduces foreign fuel dependency.

Reduced Price Volatility: Energy supply constraints and the uneven global distribution of fossil fuels increase the instability of the energy market. As the demand for global fossil fuels rises, energy prices would likely be subject to fluctuations and frequent price spikes. Renewables would contribute to the diversification of the energy supply mix, thereby buffering local economies from the volatile global energy market.

Economic Development: Development of renewable energy infrastructure (e.g., solar farms, wind turbines) would create new jobs, taxes, and revenue for local and regional economies.

Public Health Improvements: Reduced regional air pollution and waste generation would contribute to overall improvements in public health.

State-6: AB 1493 (Pavley)/Advanced Clean Cars) and Executive Order S-1-07 (Low Carbon Fuel Standard)

Measure Description

AB 1493 (Pavley) will reduce GHG emissions from automobiles and light duty trucks by 30% from 2002 levels by the year 2016. The regulations affect 2009 models and newer. The "Advanced Clean Cars" regulations introduces new standards for model years 2017–2025, and will reduce GHG emissions from automobiles and light duty trucks by 34 percent from 2017 levels by 2025.

The Low Carbon Fuel Standard (LCFS) reduces GHG emissions by requiring a low carbon intensity of transportation fuels sold in California by at least 10% by the year 2020.

Assumptions

Quantification of this measure employs the following assumptions:

- Assumptions are embodied in the EMFAC2011 model (California Air Resources Board 2011b).

Analysis Details

GHG Analysis

Engine efficiency improvements will reduce fuel consumption, thereby reducing GHG emissions from fossil fuel combustion.

The LCFS is a policy-based strategy that targets carbon emissions generated through the lifecycle of transportation fuels (i.e., from extraction to production to consumption). The standard assigns a maximum level of GHG emissions per unit of fuel produced for several refiners and importers. Companies that exceed the LCFS through development of biofuels and other clean technologies are able to sell their excess credits, creating a flexible and dynamic market for low-carbon transportation fuels (Sperling and Yen 2009).

CARB approved the LCFS on April 23, 2009 and the regulation became effective on January 12, 2010 (California Air Resources Board 2011). The U.S. District Court for the Eastern District of California ruled in December 2011 that the LCFS violates the Commerce Clause of the U.S. Constitution. CARB appealed this ruling in 2012 and on September 18, 2013, a 9th U.S. Circuit Court of Appeals panel upheld the LCFS, ruling that the program does not violate the Commerce Clause and remanded the case to the Eastern District. It is assumed that the LCFS will be ultimately implemented by 2020 as proposed. If the LCFS were ultimately to be blocked from implementation due to federal legal constraints, then the goals for local reduction by the city may need to be adjusted downward accordingly.

2020 BAU Emissions

The GHG Inventory quantified emissions associated with on-road transportation in 2020 under BAU conditions using emission factors generated by EMFAC 2011 and VMT data provided by SCAG (California Air Resources Board 2011b). These emission factors do not assume the implementation of Pavley/Advanced Clean Cars and the LCFS.

Emissions Reductions

The EMFAC2011 model was used to generate emission factors for vehicles traveling within San Bernardino County (in the Mojave Desert Air Basin and South Coast Air Basin) for the year 2020 with implementation of Pavley/Advanced Clean Cars and LCFS (California Air Resources Board 2011b). These emission factors were multiplied by the 2020 BAU VMT for the city and compared to the 2020 BAU emissions. The difference in emissions equal the reductions associated with Pavley/Advanced Clean Cars and the LCFS.

Co-Benefit Analysis

The following benefits are expected from implementation of Pavley/Advanced Clean Cars and the LCFS.

Reduced Energy Use: Pavley/Advanced Clean Cars would increase the fuel efficiency of passenger vehicles, which would reduce the amount of fossil fuels consumed per mile travelled. The LCFS would reduce the carbon content of transportation fuels by 10%. The combustion of hydrocarbons generates a number of air pollutants, including particulate matter, carbon monoxide, sulfur dioxide[7], and ozone precursors[8]. Reducing the carbon content of transportation fuels would therefore reduce local and regional air pollution.

Reduced Air Pollution: Efficient vehicles burn less fuel per mile travelled then less efficient vehicles. Air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors, would therefore be reduced.

Public Health Improvements: Fossil fuel combustion releases several toxic air containments known to cause adverse human health effects. Improvements in vehicle efficiency would reduce the amount of fuel combusted, resulting in corresponding reductions in toxic air containments. Additionally, reductions in ozone precursors would reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity.

Energy Security: In 2009, 51% of petroleum consumed by the U.S. was imported from oversees (Energy Information Administration 2010). Reducing fuel consumption by passenger vehicles would lessen the demand for petroleum and ultimately the demand for imported oil.

Reduced Price Volatility: Energy supply constraints and the uneven global distribution of fossil fuels increase the instability of the energy market. As the demand for global fossil fuels rises, fuel prices would likely be subject to fluctuations and frequent price spikes. Biofuels and other renewable technologies would contribute to the diversification of the energy supply mix, thereby buffering local economies from the volatile global energy market.

Economic Development: The development of biofuels and other clean technologies would create new jobs, taxes, and revenue for local and regional economies.

[7] Sulfur dioxide contributes to acid rain.

[8] Ozone precursors (reactive organic compounds and nitrogen oxides) contribute to smog formation.

State-7: AB 32 Transportation Reduction Strategies

Measure Description

The AB 32 Scoping Plan includes vehicle efficiency measures (in addition to Pavley/Advanced Clean Cars and LCFS) that focus on maintenance practices. The Tire Pressure Program will increase vehicle efficiency by assuring properly inflated automobile tires to reduce rolling resistance. The Low Friction Oils Program will increase vehicle efficiency by mandating the use of engine oils that meet certain low friction specifications. The Heavy-Duty Vehicle GHG Emission Reduction Program will increase heavy-duty vehicle (long-haul trucks) efficiency by requiring installation of best available technology and/or CARB approved technology to reduce aerodynamic drag and rolling resistance.

Assumptions

Quantification of this measure employed the following assumptions:

- Tire Pressure Program will reduce statewide emissions from passenger vehicles by 0.6 million MT CO_2e (California Air Resources Board 2011a), corresponding to a 0.39% reduction in Statewide 2020 BAU emissions.
- Low Friction Oils Program will reduce statewide emissions from passenger vehicles by 2.8 million MT CO_2e (California Air Resources Board 2011a), corresponding to a 1.8% reduction in Statewide 2020 BAU emissions.
- Heavy-Duty Vehicle GHG Emission Reduction Program will reduce statewide emissions from heavy-duty vehicles by 0.9 million MT CO_2e (California Air Resources Board 2011a), corresponding to a 2.2% reduction in Statewide 2020 BAU emissions.
- The percent reduction in transportation emissions in the city will be equal to the percent reduction in transportation emissions reductions on a state level.

Analysis Details

GHG Analysis

Improvements in engine efficiency and vehicle technology will reduce fuel consumption, thereby reducing GHG emissions from fossil fuel combustion.

2020 BAU Emissions

The GHG Inventory quantified emissions associated with on-road transportation in 2020 under BAU conditions. The Tire Pressure and Low Friction Oils programs primarily affect light-duty vehicles, whereas the Heavy-Duty GHG Emissions Reduction Program affects heavy-duty vehicles. 2020 BAU emissions from light-duty autos and heavy-duty vehicles are approximately 970,000 and 276,000 MT CO_2e, respectively.

Emissions Reductions

Tire Pressure

CARB estimates that implementation of the Tire Pressure Program will reduce statewide emissions from passenger vehicles by 0.6 million MT CO_2e, or by approximately 0.39% (California Air Resources Board 2011a). GHG reductions achieved by the Tire Pressure Program within the city were therefore quantified by multiplying 2020 BAU emissions from passenger vehicles by 0.0039.

Low Friction Oils

CARB estimates that implementation of the Low Friction Oils Program will reduce statewide emissions from passenger vehicles by 2.8 million MT CO_2e, or by approximately 1.8% (California Air Resources Board 2011a). GHG reductions achieved by the Low Friction Oils Program within the city were therefore quantified by multiplying 2020 BAU emissions from passenger vehicles by 0.018.

Heavy-Duty Vehicle GHG Emissions Reductions

CARB estimates that implementation of the Heavy-Duty Vehicle GHG Emission Reduction Program will reduce statewide emissions from heavy-duty vehicles by 0.9 million MT CO_2e, or by approximately 2.2% (California Air Resources Board 2011a). GHG reductions achieved by the Heavy-Duty Vehicle GHG Emission Reduction Program within the city were therefore quantified by multiplying 2020 BAU emissions from heavy-duty vehicles by 0.022.

Co-Benefit Analysis

The following benefits are expected from implementation of AB 32 Transportation Reduction Strategies.

Reduced Energy Use: The AB 32 Transportation Reduction Strategies would increase the efficiency of passenger vehicles and heavy-duty trucks, which would reduce the amount of fossil fuels consumed per mile travelled.

Reduced Air Pollution: Efficient vehicles burn less fuel per mile travelled then less efficient vehicles. Air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors, would therefore be reduced.

Public Health Improvements: Fossil fuel combustion release several toxic air containments known to cause adverse human health effects. Improvements in vehicle efficiency would reduce the amount of fuel combusted, resulting in corresponding reductions in toxic air containments. Additionally, reductions in ozone precursors would reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity.

Energy Security: In 2009, 51% of petroleum consumed by the U.S. was imported from oversees (Energy Information Administration 2010). Reducing fuel consumption by passenger vehicles would lessen the demand for petroleum and ultimately the demand for imported oil.

State-8: SB 375 Sustainable Communities Strategy [V]

Measure Description

SB 375 provides for a new planning process that coordinates land use planning, regional transportation plans (RTPs), and funding priorities in order to help California meet the GHG reduction goals established in AB 32. While Pavley/Advanced Clean Cars and LCFS seek to reduce fuel consumed and reduce the carbon content of fuel consumed, SB 375 seeks to reduce VMT through land use planning. SB 375 requires RTPs, developed by metropolitan planning organizations (MPOs) to incorporate a "sustainable communities strategy" (SCS) in their RTPs. The goal of the SCS is to reduce regional vehicle miles traveled (VMT) through land use planning and consequent transportation patterns. The regional GHG reduction target for the local MPO, the Southern California Associated Governments (SCAG), is 9% by 2020 and a 16% reduction by 2035 compared to 2005 GHG emissions on a per capita basis. SCAG's 2012–2035 RTP/SCS successfully achieves and exceeds these targets set by ARB (Southern California Association of Governments 2012b).

Although this is a state measure because SB 375 is promulgated at the state level, it will require local action from the city to implement. The city will need to implement actions and policies to carry out the SCS for SCAG, by emphasizing Transit Oriented Development and infill, by improving transit infrastructure and service, and by investing in biking and walking infrastructure, for example. In order to comply with the SCS in Ontario, the city has adopted the Ontario Plan, or "TOP", which is a city planning framework that contains many transportation and land use-related actions to reduce vehicle-related GHG emissions throughout the SANBAG region. The Ontario Plan will support the goals of SB 375 and the Sustainable Communities Strategy (Transportation-1) through a wide range of actions which include the following.

- Integrate state, regional and local Sustainable Community/Smart Growth principles into the development and entitlement process.
- Develop a system of trails and corridors that facilitates and encourages bicycling and walking, including the Multipurpose Trails & Bikeway Corridor Plan.
- Require new development to provide transit facilities, such as bus shelters, transit bays and turnouts, as necessary.
- Require the future development of community-wide serving facilities to be sited in transit-ready areas that can be served and made accessible by public transit.
- Provide development-related incentives for projects that promote transit use.
- Ensure the development of a multimodal transit center near LAONT airport to serve as a transit hub for local buses, BRT, the Gold Line, high-speed rail, the proposed Ontario Airport Metro Center circulator and other future transit modes.
- Support extension of the Metro Rail Gold Line to Ontario and advocating the expansion of Metrolink service to include the Downtown and the multimodal transit center.
- Designate and maintain a network of city truck routes that provide for the effective transport of goods while minimizing negative impacts on local circulation and noise-sensitive land uses, as shown in the Truck Routes Plan.

Assumptions

The following assumptions were considered in the evaluation of this measure:

- The percentage reduction in per-capita VMT associated with the SCS in the SCAG region is 2.4% by 2035 (Fehr and Peers 2011, Table 11).
- The percentage reduction in per-capita VMT associated with the SCS in 2020 is approximately 1% (linear interpolation from 2008 to 2035)
- This measure includes 50,596 MT CO_2e reductions from The Ontario Plan (The Planning Center 2009). This is based on a total reduction of 209,614 MT CO_2e for the year 2035 for total trips in the entire SCAG region. This value was scaled to the year 2020 and scaled again from region-wide trips to origin-destination trips, to be consistent with the GHG inventory and BAU forecast.
- The percent reduction in VMT was assumed to be commensurate with the percent reduction in GHGs.

Analysis Details

GHG Analysis

VMT reduction through land use planning will reduce GHG emissions associated with on-road transportation.

BAU On-Road Emissions

The GHG Inventory quantified emissions associated with on-road transportation in 2008 and in 2020 under BAU conditions. Population for 2008 and 2020 was used to determine per-capita light/medium-duty VMT for 2008 and 2020 BAU.

Emissions Reductions

The percent change in per-capita light/medium-duty VMT from 2008 to 2020 under BAU conditions was calculated for the city. 1% was subtracted from this value to determine the new percent change in per-capita light/medium-duty VMT from 2008 to 2020 with implementation of this measure. Then the per-capita light/medium-duty VMT in 2008 was multiplied by the new percent change in per-capita VMT to determine the new per-capita VMT in 2020. The new per-capita VMT in 2020 was then multiplied by the projected population in 2020 to determine a new total 2020 VMT. The VMT reduction was calculated by subtracting the new 2020 VMT from the 2020 BAU VMT.

In Ontario, the 2008 per-capita VMT is 10,841 and the 2020 BAU per-capita VMT is 10,489. The change in per-capita VMT is -3.2%. Subtracting 1% from this yields a -4.2% change. A -4.2% change in per-capita VMT from 2008 is 10,381. So, the reduction in VMT would be 108 miles per-capita.

The percent reduction in VMT was assumed to be commensurate with the percent reduction in GHGs. Emission reductions associated with this measure were therefore calculated by multiplying the percent reduction in VMT by the BAU emissions for light-duty autos.

For TOP GHG reductions, the difference in 2035 SCAG regional transportation GHG emissions (with Ontario) between the existing general plan and the TOP was used to calculate the reduction for the City of Ontario. 2035 SCAG regional transportation GHG emissions for the existing general plan are 124,162,369 MT CO_2e and for the TOP are 124,371,983 MT CO_2e for a reduction of 209,614 MT CO_2e (The Planning Center 2009). This reduction was scaled to the year 2020 using a linear interpolation from the start year (2006) to the end year (2035); this scaling factor is 0.48 (or 48% of the 2035 GHG reductions would occur in the year 2020). 2020 reductions are therefore 101,193. Because the GHG inventory and BAU forecast use origin-destination approach to calculating VMT associated with Ontario, an additional scaling factor of 0.5 was applied to the calculated 2020 reductions. This scaling factor was assumed to be 0.5 which means that approximately half of the total SCAG region trips either begin in Ontario, end in Ontario, or begin and end in Ontario. After applying this scaling factor, the final GHG reductions are 50,596 MT CO_2e.

Co-Benefit Analysis

The following benefits are expected from implementation of State-8.

Reduced Energy Use: Increased density would reduce the number of private vehicle trips made within each city. As a result, gasoline and diesel consumption would be reduced.

Reduced Air Pollution: Because less petroleum would be consumed by vehicles, air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors, would be reduced. Likewise, reductions in congestion from fewer vehicles on the roadway network would contribute reductions in emissions generated by vehicle idling.

Public Health Improvements: Fossil fuel combustion release several toxic air containments known to cause adverse human health effects. Reductions in the amount of fuel combusted would result in corresponding reductions in toxic air containments. Additionally, reductions in ozone precursors would reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity.


Energy Security: In 2009, 51% of petroleum consumed by the U.S. was imported from oversees (Energy Information Administration 2010). Reducing fuel consumption would lessen the demand for petroleum and ultimately the demand for imported oil.


Increased Quality of Life: Increased density along transit routes, employment corridors, and in downtown areas would increase the accessibility of public transportation and basic services. Reductions in the number of vehicle trips may also reduce congestion and travel times.


Smart Growth: Increased density in the urban core is a form of smart growth development that creates more walkable and accessible environments.

State-9: Executive Order S-1-07 (Low Carbon Fuel Standard) for Offroad Equipment

Measure Description

Requires a 10% reduction in the carbon intensity of California's transportation fuels by 2020.

Assumptions

Quantification of this measure employs the following assumptions:

- Low Carbon Fuel Standard (LCFS) will reduce statewide emissions from transportation-based fuels[9] by 15 million MT CO_2e (California Air Resources Board 2011a). This is equivalent to an 8.9% reduction in emissions from transportation fuels.

Analysis Details

GHG Analysis

See measure State-6 above for a detailed description of the LCFS. State-9 applies the LCFS to the Offroad Transportation and Equipment sector only (State-6 applies to on-road transportation only).

2020 BAU Emissions

The GHG Inventory quantified emissions associated with off-road transportation and equipment in 2020 under BAU conditions.

Emissions Reductions

CARB estimates that implementation of the LCFS will reduce statewide emissions from transportation-based fuels[9] by 15 million MT CO_2e, or by approximately 8.9% (California Air Resources Board 2011a). GHG reductions achieved by the LCFS within the city were therefore quantified by multiplying BAU off-road emissions by 0.089.

Co-Benefit Analysis

The following benefits are expected from implementation of LCFS.

Reduced Air Pollution: The LCFS would reduce the carbon content of transportation fuels by 10%. The combustion of hydrocarbons generates numbers air pollutants, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors. Reducing the carbon content of transportation fuels would therefore reduce local and regional air pollution.

Public Health Improvements: Fossil fuel combustion release several toxic air containments known to cause adverse human health effects. Improvements in vehicle efficiency would reduce the amount of fuel combusted, resulting in corresponding reductions in toxic air containments. Additionally, reductions in ozone precursors would reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity.

Energy Security: In 2009, 51% of petroleum consumed by the U.S. was imported from oversees (Energy Information Administration 2010). Reducing the carbon-content of transportation fuels would reduce the consumption and demand for imported petroleum.

Reduced Price Volatility: Energy supply constraints and the uneven global distribution of fossil fuels increase the instability of the energy market. As the demand for global fossil fuels rises, fuel prices would likely be subject to fluctuations and frequent price spikes. Biofuels and other renewable technologies would contribute to the diversification of the energy supply mix, thereby buffering local economies from the volatile global energy market.

Economic Development: The development of biofuels and other clean technologies would create new jobs, taxes, and revenue for local and regional economies.

[9] Excludes aviation fuel, residual fuel oil, and lubricants.

County-1: San Bernardino County GHG Reduction Plan Landfill Controls

Measure Description

The County of San Bernardino, through their adopted GHG Emissions Reduction Plan, will install landfill gas controls on the following County-owned and operated landfills (County of San Bernardino 2011):

- 95% capture at Mid-Valley landfill
- 85% capture at Milliken and Colton landfills
- 75% capture at Barstow and Landers landfills

Since these landfills serve Ontario, the city will realize GHG reductions from the county's installation of landfill gas controls.

Assumptions

Quantification of this measure employs the following assumptions:

- The methane capture rate increases at the Mid-Valley landfill from 75% to 95%
- The methane capture rate increases at the Milliken landfill from 54% to 85% and at the Colton landfill from 37% to 85%
- The methane capture rate increases at the Barstow and Landers landfills from 0% to 75%

Analysis Details

GHG Analysis

Methane capture systems can reduce the amount of methane released from the decomposition of waste.

Emissions Reductions

The landfills listed above would install landfill gas controls as noted above. Some of these landfills currently have methane capture systems. Pursuant to this measure, it was assumed that by 2020, all 5 landfills would install a methane system with capture efficiencies as noted above. GHG emissions generated by city-generated waste in 2020 were re-calculated using these assumptions and the methods outlined in the GHG Inventory.

Co-Benefit Analysis

The following benefits are expected from implementation of the San Bernardino County GHG Plan Landfill Controls.

Reduced Air Pollution: Capture systems prevent methane from migrating into the atmosphere and contributing to local smog.

Resource Conservation: Anaerobic digesters help prevent groundwater contamination by reducing the leaching of organic pollutants. The integrity of freshwater systems would therefore be conserved.

Increased Quality of Life: Methane capture helps reduce odors and other hazards associated with landfill gas emissions.

PS-1: GHG Performance Standard for New Development [M]

Measure Description

The city will adopt a GHG Performance Standard for New Development (PS), which will provide a streamlined and flexible program for new projects to reduce their emissions. This measure would include a performance standard for new private developments as part of the discretionary approval process under CEQA. New projects would be required to quantify project-generated GHG emissions and adopt feasible reduction measures to reduce project emissions to a level which is 25% below BAU project emissions.

The PS applies to all projects emitting more than 3,000 MT CO_2e per year, which is roughly equivalent to 90% of projects. Projects emitting less than this amount must implement a suite of BMPs.

Assumptions

The following assumptions were considered in the evaluation of this measure:

- Emissions were estimated for the year 2012 for the city using socioeconomic data. Socioeconomic data for the year 2012 was not available, so population, jobs, and housing were estimated using linear growth from 2010–2020.
- The PS percent reduction in new development emissions was determined for Ontario (refer to Appendix B).
- Some state measures which will affect new development, and therefore might overlap with the PS measure, could not be broken down into reductions associated with new development only (e.g., RPS, Pavley). Consequently, these measures were not included in the calculation of the PS.

Analysis Details

GHG Analysis

Implementation of the performance standard would reduce GHG emissions attributable to new discretionary development projects by 25% by 2020. Measurable reductions of GHG emissions would be achieved through the city's review and discretionary approval of residential, commercial, and industrial development projects. It is expected that project proponents would often include energy efficiency and alternative energy strategies to help reduce their project's GHG emissions because these are often the most cost-effective approach to reducing GHG emissions but are free to propose any valid measures that would achieve the overall reduction goal.

2020 BAU Emissions

An estimate of emissions in 2012 was performed using inventory and socioeconomic data for 2008 and 2020. 2012 emissions were estimated using the same methods that were used to forecast 2008 emissions to 2020, as feasible. Socioeconomic data for 2012 was not available. This data was estimated using linear growth from 2010–2020.

Although PS-1 won't apply to new development constructed before presumed CCAP adoption in 2014, the City has already been requiring projects to adopt GHG mitigation for new projects in 2013 and 2014. The City's GHG mitigation measures have been delivering the rough equivalent of PS-1 for new development in 2013 and in 2014 before adoption of the CCAP. For example, the Grand Park Specific Plan was approved in December 2013 and the adopted EIR included Mitigation Measures AQ-4 and AQ-5. Measure AQ-4 requires the recycling of construction waste, energy efficiency in building design, urban heat island mitigation, the use of energy efficiency appliances and fixtures, energy audits, outlets for electric landscaping, diversion of solid waste from landfills, and the support of pedestrian facilities and shade trees. Measure AQ-5 requires safe and convenient access for pedestrians and bicyclist, support for electric vehicle and plug-in electric vehicles (such as vehicle access and wired receptacles), traffic calming, bicycle facilities, transit support, energy efficient traffic lights, and water conservation (Michael Brandman Associates 2013). These mitigation measures (and other measures applied to other discretionary projects) will reduce emissions on par with PS-1 and thus development in 2013 and 2014 prior to adoption of the CCAP and implementation of PS-1 would have similar reductions to subsequent approvals with implementation of PS-1.

Emissions Reductions

In order to calculate the reductions from this measure, a 25% reduction from new development emissions from 2012 to 2020 was estimated for the city. State measures and local mandatory measures were quantified for new development. These measures achieve approximately 65% of the PS goal, or reduce new development emissions by 16%. The PS contributes the remaining 9% reduction required to achieve the 25% PS goal for new developments. As noted above,

prior to CCAP adoption, the City has already been requiring mitigation measures that reduce air quality and GHG emissions similar to the level that will result from implementation of PS-1, so the calculation includes reductions through CEQA mitigation in 2013 and 2014 as well as reductions from 2014 to 2020 with PS-1 implementation.

The value of these state and local measures for new development were subtracted from the PS reduction to derive the net additional reductions that would result from the PS implementation. This does not mean that the other state and local measures would apply on an equal basis for every single project; individual new development projects may have higher or lower project-level burdens than the average. However, state and local mandatory measures are still expected to result in the largest share of the burden in meeting the PS reduction target for all cities (with a smaller portion from project-level reductions).

Co-Benefit Analysis

Co benefits will depend on the exact measures selected by individual project proponents, but would be the same as the corresponding strategies described below, i.e., if a project proponent were to select energy-efficiency measures as part of meeting their project reductions, the benefits would be similar in character to those described below for energy efficiency retrofits.

BMP-1: Performance Standard for Smaller New Development Projects: Best Management Practices. Exceed Title 24 Energy-Efficiency Standards for New Buildings by 5% by 2020 [M]

Measure Description

All new land use development projects emitting less than 3,000 MT CO_2e per year, which is roughly equivalent to 10% of projects, will be required to exceed the Energy Efficiency Standards under Title 24 by at least 5% for all new residential and commercial buildings, or provide an equivalent level of alternate GHG emission reductions.

Assumptions

The following assumptions were considered in the evaluation of this measure:

- 10% of new homes and commercial buildings will be affected (built from 2013–2020)
- Reductions reflect an additional 5% exceedance of Title 24 for 10% of new buildings.
- The ratio of single-family household electricity and natural gas use to multi-family household electricity and natural gas use is 1.39 and 1.23, respectively (Energy Information Administration 2009)
- Climate zone 10 was used for Ontario (California Air Pollution Control Officers Association 2010).
- The energy reduction for a 1% improvement over 2008 T24 standards for Climate Zone 10 are as follows (California Air Pollution Control Officers Association 2010):
  - 0.18% reduction in electricity use for single-family homes
  - 0.83% reduction in natural gas use for single-family homes
  - 0.26% reduction in electricity use for multi-family homes
  - 0.80% reduction in natural gas use for multi-family homes
  - 0.30% reduction in electricity use for commercial buildings
  - 0.61% reduction in natural gas use for commercial buildings

Analysis Details

GHG Analysis

Implementation of BMP-1 would reduce GHG emissions attributable to 10% of new development projects by exceeding Title-24 requirements by 5%. This would reduce energy consumption (electricity and natural gas) and the associated GHG emissions (Appendix B).

2020 BAU Emissions

The GHG Inventory quantified electricity and natural gas emissions associated with existing residential and nonresidential facilities in 2008. The 2008 values were projected to 2012 in order to determine electricity and natural gas use and emissions for all new buildings built from 2013 to 2020, The number of single-family and multi-family residences in 2012 was estimated by interpolating from the 2008 and 2020 values for the city.

Although BMP-1 won't apply to new development constructed before mid to late 2014, the GHG reductions that would have been obtained by this measure for projects constructed in 2013 and the first half of 2014 are small (a maximum of 120 $MTCO_2e$ out of 474 $MTCO_2e$ total). Thus, although the calculation assumed application of BMP-1 in 2013 and the first half of 2014, the potential loss in reductions will be minor and won't affect the overall ability of the City to meet the CAP reduction target overall. Also, similar to the discussion above for PS-1, some of the 2013/2014 projects that would be subject to BMP-1 are discretionary projects subject to CEQA and thus would likely have CEQA mitigation measures adopted during their respective CEQA process.

Emissions Reductions

Energy reductions associated with State-1 (T24), State-2 (AB1109), and Energy-3 (Energy Efficiency Funding for Existing Low-Income Residents) were subtracted from the energy used by all new buildings built from 2013 to 2020. This was done in order to determine the energy used by new buildings after the implementation of preceding measures, before the application of BMP-1.

New energy use (2013–2020) for single-family and multi-family homes was estimated by multiplying total residential energy use by the ratios listed in the assumptions section above, taking into consideration the number of single-family and multi-family homes within the city.

Energy reductions (electricity and natural gas) were then estimated by multiplying the new energy use for single-family homes, multi-family homes, and nonresidential buildings by the 5% reduction beyond T24 as specified by BMP-1 and then multiplying by the appropriate factor from CAPCOA for a 1% reduction beyond 2008 T24 standards (California Air Pollution Control Officers Association 2010).

GHG emissions reductions achieved by BMP-1 were quantified by multiplying the energy reductions for each building type by the appropriate utility emission factors.

Co-Benefit Analysis

The following benefits are expected from implementation of BMP-1.

Reduced Energy Use: Energy retrofits and standards would improve the efficiency of residential and non-residential buildings. As such, the amount of energy (e.g., electricity, natural gas) consumed per unit of activity would be lowered.

Reduced Air Pollution: Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity) and local air pollution (from reduced burning of natural gas).

Resource Conservation: Increased building efficiency would reduce water consumption, which would help conserve freshwater.

Increased Property Values: Energy-efficient bulidings have higher property values and resale prices than less efficient buildings.

Public Health Improvements: Reduced regional and local air pollution would contribute to overall improvements in public health. A well-built, energy-efficient structure is also more durable and directly reduces certain health aliments. For example, properly sealed ducts and air leaks helps prevent mold and dust mites that can cause asthma.

Increased Quality of Life: The reduction of health aliments (see above) contributes to increased quality of life. Additionally, energy-efficient structures improve general comfort by equalizing room temperatures and reducing indoor humidity.

Energy-3: Energy Efficiency Funding for Existing Low-Income Residents [V]

Measure Description

Partner with community services agencies to fund energy efficiency projects, including heating, ventilation, air conditioning, lighting, water heating equipment, insulation, and weatherization, for low income residents. Provide permitting-related and other incentives for energy efficient building project.

Assumptions

The following assumptions were considered in the evaluation of this measure:

- The assumed market penetration rate for residential buildings performing retrofits was 27%.
- Participating residences perform weatherization for low-income households. To calculate reductions from low-income weatherization, the following assumptions were used:
  - The number of low-income households in Ontario was determined by multiplying the total number of households in the city (Southern California Association of Governments 2012a) by the percent of homes classified as extreme low income, very low income, and lower income (Southern California Association of Governments 2011). This percent is 37.7%.
  - Weatherization only applies to low-income households.
  - Energy savings from low-income weatherization are 20%, 32%, and 32% for heating electricity, natural gas, and fuel oil, respectively (Schweitzer 2005)
- Ontario will also launch energy efficiency campaigns targeted at residents and promote smart grid. This will result in a 5% energy savings (electricity and natural gas). This value was discounted from ICLEI's Climate and Air Pollution Planning Assistant (CAPPA) value of 10% for the measure "Energy Efficiency Education Targeted at Residents" in order to be more conservative (ICLEI Local Governments for Sustainability 2010).

Analysis Details

GHG Analysis

Existing buildings generate a considerable amount of GHG emissions. Older developments are typically less energy-efficient and therefore consume greater amounts of electricity and natural gas, relative to newly constructed facilities.

BAU Energy Use

BAU electricity and natural gas use for residential buildings were used to calculate reductions for this measure. The GHG inventory (Appendix A) documents the energy use and assumptions employed for the BAU analysis.

The number of low income homes in 2008 (and their respective energy use) was projected to 2012 in order to determine electricity and natural gas use and emissions for all existing homes built before 2013, which are subject to Energy-3. The number of single-family and multi-family residences in 2012 was estimated by interpolating from the 2008 and 2020 values for the city.

A "start" date of 2012 for Energy-3 is sufficient for purposes of GHG quantification because this measure relies on incentives that generally already exist and retrofits are already occurring throughout the city. Example retrofit programs currently underway include Energy Upgrade California, SCE programs, CPUC programs, the Home Energy Renovation Opportunity (HERO) program, GRID Alternative program Southern California Gas Company (SCG) programs, along with state and federal tax breaks. Although the GHG quantification doesn't include retrofits for existing homes constructed during 2013 and 2014, the actual adopted measure will apply to these homes. Therefore the GHG quantification is conservative in estimating GHG reductions for homes constructed on or before 2012.

Emissions Reductions

Energy savings for each sub-measure were generally calculated by multiplying BAU energy use by a penetration rate, and then by a percent reduction in energy use. Emission reductions were then calculated by multiplying the energy savings by the appropriate emission factors.

For low-income weatherization, the total projected number of homes existing in 2012 was multiplied by the percent of low-income homes as determined by SCAG (Southern California Association of Governments 2011). The number of low-income homes was then multiplied by the penetration rate (27%). Then, the energy used for electric heating, natural gas heating, and fuel oil use was estimated by multiplying the number of low-income households by the respective energy use factors as detailed in the assumptions section above. The resulting energy use was multiplied by the percent reduction in energy use for low-income weatherization by energy source (see assumptions above) to determine energy reductions.

For efficiency campaigns targeted at residents, the total residential energy use (electricity and natural gas) in 2012 was multiplied by 27%. The resulting energy use was then multiplied by 5% to determine energy savings for residential buildings.

GHG emissions savings were then quantified by multiplying the energy reductions by the appropriate utility emission factors.

Co-Benefit Analysis

The following benefits are expected from implementation of Energy-3.


Reduced Energy Use: Energy retrofits would improve the efficiency of residential buildings. As such, the amount of energy (e.g., electricity, natural gas) consumed per unit of activity would be lowered.


Reduced Air Pollution: Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity) and local air pollution (from reduced burning of natural gas).


Increased Property Values: Energy-efficient homes have higher property values and resale prices than less efficient homes.


Public Health Improvements: Reduced regional and local air pollution would contribute to overall improvements in public health. A well-built, energy-efficient structure is also more durable and directly reduces certain health aliments. For example, properly sealed ducts and air leaks helps prevent mold and dust mites that can cause asthma.


Increased Quality of Life: The reduction of health aliments (see above) contributes to increased quality of life. Additionally, energy-efficient homes improve general comfort by equalizing room temperatures and reducing indoor humidity.

Energy-4: Energy Efficiency Incentives and Programs to Promote Retrofits for Existing Residential Buildings [V]

Measure Description

Incentivize, or otherwise support, voluntary energy efficiency retrofits of existing residential buildings to achieve reductions in natural gas and electricity usage. Adopt standards and/or promote voluntary programs that retrofit indoor lights, electric clothes dryers, energy-star thermostats, window seals, duct sealing, air sealing, and attic insulation.

Assumptions

The following assumptions were considered in the evaluation of this measure:

- The assumed market penetration rate for residential buildings performing retrofits was 27%.
- 50% of participating homes will conduct a basic retrofit package. This package includes the following retrofits:
  - Replace interior high use incandescent lamps with compact florescent lamps (CFLs)
  - Seal air leaks
- 30% of participating homes will conduct an advanced retrofit package. This package includes the following retrofits:
  - All basic retrofits listed above
  - Seal duct leaks
  - Install a programmable thermostat
  - Replace windows with double-pane, solar-control low E-argon gas wood frame windows
- 20% of participating homes will conduct a premium retrofit package. This package includes the following retrofits:
  - All basic and advanced retrofits listed above
  - Insulate the attic
  - Replace electric clothes dryers with natural gas dryers
  - Replace natural gas furnaces with ENERGY STAR labeled models
- Energy reductions achieved by the basic retrofit level would be 1,084 kWh and 79 therms per single-family house (U.S. Department of Energy 2013).
- Energy reductions achieved by the advanced retrofit level would be 2,199 kWh and 128 therms per single-family house (U.S. Department of Energy 2013).
- Energy reductions achieved by the premium retrofit level would be 3,081 kWh and 238 therms per single-family house (U.S. Department of Energy 2013).

Analysis Details

GHG Analysis

Existing buildings generate a considerable amount of GHG emissions. Older developments are typically less energy-efficient and therefore consume greater amounts of electricity and natural gas, relative to newly constructed facilities.

BAU Energy Use

BAU electricity and natural gas use for residential buildings were used to calculate reductions for this measure. The GHG inventory documents the energy use and assumptions employed for the BAU analysis.

The number of homes in 2008 (and their respective energy use) was projected to 2012 in order to determine electricity and natural gas use and emissions for all existing homes built before 2013, which are subject to Energy-4. The number of single-family and multi-family residences in 2012 was estimated by interpolating from the 2008 and 2020 values for the city.

A "start" date of 2012 for Energy-4 is sufficient for purposes of GHG quantification because this measure relies on incentives that generally already exist and retrofits are already occurring throughout the city. Example retrofit programs currently underway include Energy Upgrade California, SCE programs, CPUC programs, the Home Energy Renovation Opportunity (HERO) program, Southern California Gas Company (SCG) programs, along with state and federal tax breaks. Although the

GHG quantification doesn't include retrofits for existing homes constructed during 2013 and 2014, the actual adopted measure will apply to these homes. Therefore the GHG quantification is conservative in estimating GHG reductions for homes constructed on or before 2012.

Emissions Reductions

For each retrofit package, the total number of homes existing in 2012 was multiplied by the penetration rate (27%). The number of participating households was then multiplied by the respective energy use savings values as detailed in the assumptions section above. GHG emissions savings were then quantified by multiplying the energy reductions by the appropriate utility emission factors.

Co-Benefit Analysis

The following benefits are expected from implementation of Energy-4.

Reduced Energy Use: Energy retrofits would improve the efficiency of residential buildings. As such, the amount of energy (e.g., electricity, natural gas) consumed per unit of activity would be lowered.

Reduced Air Pollution: Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity) and local air pollution (from reduced burning of natural gas).

Increased Property Values: Energy-efficient homes have higher property values and resale prices than less efficient homes.

Public Health Improvements: Reduced regional and local air pollution would contribute to overall improvements in public health. A well-built, energy-efficient structure is also more durable and directly reduces certain health aliments. For example, properly sealed ducts and air leaks helps prevent mold and dust mites that can cause asthma.

Increased Quality of Life: The reduction of health aliments (see above) contributes to increased quality of life. Additionally, energy-efficient homes improve general comfort by equalizing room temperatures and reducing indoor humidity.

Energy-5: Energy Efficiency Incentives and Programs to Promote Retrofits for Existing Non-Residential Buildings [V]

Measure Description

Promote energy efficiency in existing nonresidential buildings, and remove funding barriers for energy efficiency improvements. Actions may include, but are not limited to: launching energy efficiency outreach/education campaigns targeted at businesses, promoting the smart grid, leveraging funding mechanisms and grant funding, scheduling energy efficiency tune-ups and promoting energy efficiency management services for large energy users.

Assumptions

The following assumptions were considered in the evaluation of this measure:

- The assumed market penetration rate for nonresidential buildings performing retrofits was 27%.
- This measure will result in a 20% reduction in energy use for participating buildings.

Analysis Details

GHG Analysis

Existing buildings generate a considerable amount of GHG emissions. Older developments are typically less energy-efficient and therefore consume greater amounts of electricity and natural gas, relative to newly constructed facilities.

BAU Energy Use

BAU electricity and natural gas use for nonresidential buildings were used to calculate reductions for this measure. The GHG inventory documents the energy use and assumptions employed for the BAU analysis.

The GHG Inventory quantified electricity and natural gas emissions associated with existing nonresidential facilities in 2008. The 2008 values were projected to 2012 in order to determine electricity and natural gas use and emissions for all existing nonresidential buildings built before 2013, which are subject to Energy-5.

A "start" date of 2012 for Energy-5 is sufficient for purposes of GHG quantification because this measure relies on incentives that generally already exist and retrofits are already occurring throughout the city. Example retrofit programs currently underway include Energy Upgrade California, SCE programs, CPUC programs, the Home Energy Renovation Opportunity (HERO) program, Southern California Gas Company (SCG) programs, along with state and federal tax breaks. Although the GHG quantification doesn't include retrofits for existing nonresidential buildings constructed during 2013 and 2014, the actual adopted measure will apply to these buildings. Therefore the GHG quantification is conservative in estimating GHG reductions for nonresidential buildings constructed on or before 2012.

Emissions Reductions

The total nonresidential energy use (electricity and natural gas) in 2008 for the city was multiplied by the penetration rate (27%). The resulting energy use was then multiplied by 20% to determine energy savings for nonresidential buildings. GHG emissions savings were then quantified by multiplying the energy reductions by the appropriate utility emission factors.

Co-Benefit Analysis

The following benefits are expected from implementation of Energy-5.

Reduced Energy Use: Energy retrofits would improve the efficiency of residential buildings. As such, the amount of energy (e.g., electricity, natural gas) consumed per unit of activity would be lowered.

Reduced Air Pollution: Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity) and local air pollution (from reduced burning of natural gas).

Increased Property Values: Energy-efficient homes have higher property values and resale prices than less efficient homes.

Public Health Improvements: Reduced regional and local air pollution would contribute to overall improvements in public health. A well-built, energy-efficient structure is also more durable and directly reduces certain health aliments. For example, properly sealed ducts and air leaks helps prevent mold and dust mites that can cause asthma.

Increased Quality of Life: The reduction of health aliments (see above) contributes to increased quality of life. Additionally, energy-efficient homes improve general comfort by equalizing room temperatures and reducing indoor humidity.

Energy-6: Streetlights [CITY, V]

Measure Description

Adopt outdoor lighting standards in the Zoning Ordinance to reduce electricity consumption above and beyond the

requirements of AB 1109. Require 40% reduction in energy use from traffic signals and streetlights by 2020.

Assumptions

The following assumptions were considered in the evaluation of this measure:

- Total 2008 Streetlight energy use is based off of the SCE inventory (26,616 MWh) which we assume includes streetlight electricity use indicated in the Ontario Municipal Inventory (10,098 MWh).
- This measure will result in a 40% savings in electricity use for streetlights and traffic signals.

Analysis Details

GHG Analysis

BAU Energy Use

BAU electricity use for streetlights and traffic signals were used to calculate reductions for this measure. The GHG inventory documents the energy use and assumptions employed for the BAU analysis.

Emissions Reductions

The total streetlights and traffic signals electricity use in 2020 for the city was multiplied by 40% to determine energy savings. GHG emissions savings were then quantified by multiplying the energy reductions by the appropriate utility emission factors.

Co-Benefit Analysis

The following benefits are expected from implementation of Energy-6.

Reduced Energy Use: Energy-efficient lighting (e.g., CFL fixtures) consumes, on average, 75% less electricity than incandescent bulbs.

Reduced Air Pollution: Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).

Increased Property Values: Energy efficient bulidings have higher property values and resale prices than less efficient buildings.

Increased Quality of Life: CFLs have a much longer lifetime than incandescent bulbs, resulting in reduced bulb turn-over and the need to purchase new fixtures.

Renewable Energy-1: Solar Installation for Existing Non-Residential for Major Rehabilitations or Expansions [V]

Measure Description

Promote installation of solar photovoltaic panels on nonresidential buildings greater or equal to 25,000 square feet in size requiring discretionary permits for major rehabilitations or expansions. "Major rehabilitations or expansions" defined as including additions of 25,000 square feet of office retail/commercial or 100,000 square feet of industrial/warehouse floor area.

Promote and incentivize solar installations on existing nonresidential buildings performing major rehabilitations or expansions through partnerships with SCE and other private sector funding sources including SunRun, SolarCity, and other solar lease or PPA companies. This could be supported through non-financial incentives or streamlined permitting. The city of Ontario may also act as a resource for connecting project proponents with funding opportunities.

Assumptions

The following assumptions were considered in the evaluation of this measure:

- 12% of all existing commercial buildings greater than 25,000 square feet and industrial/warehouse buildings greater than 100,000 square feet are rehabilitated by 2020, and must install solar panels.
- Based on the participation rate, 4.1 million square feet of commercial space and 1.5 million square feet of industrial/warehouse space participate in this measure. This is approximately 7% of all existing nonresidential buildings in the City.
- The average number of stories is 1.1 (commercial) and 1.0 (industrial)
- The average percentage of roof space that can install solar is 70%
- Each square foot of solar PV produces 10 watts of electricity, which is equivalent to 15.36 kWh per year (U.S. Department of Energy 2005).
- This measure is equivalent to 24 MW of solar or 2.3 million square feet of solar panels installed.
- The energy generated by solar PV is carbon neutral (California Air Pollution Control Officers Association 2010).
- The average annual electricity generation per solar system is 1,536 kWh per kW of solar PV installed (National Renewable Energy Laboratory 2012).
- The amount of electricity generated by the panels will offset electricity provided by the utilities. For example, a system which generates 7,683 kWh in a year will offset 7,683 kWh produced by power plants, and therefore reduce emissions associated with 7,683 kWh of electricity generation.

Analysis Details

GHG Analysis

Utilizing electricity generated by solar photovoltaic panels displaces electricity demand that would ordinarily be provided by the utilities. Although SCE purchases a substantial amount of energy from renewable sources, electricity supplied by SCE still represents a source of indirect GHG emissions. Carbon neutral sources, such solar, do not emit GHGs (California Air Pollution Control Officers Association 2010).

BAU Energy Use

BAU electricity and natural gas use for nonresidential buildings were used to calculate reductions for this measure. The GHG inventory documents the energy use and assumptions employed for the BAU analysis.

The GHG Inventory quantified electricity and natural gas emissions associated with existing nonresidential facilities in 2008. The 2008 values were projected to 2012 in order to determine electricity and natural gas use and emissions for all existing nonresidential buildings built before 2013, which are subject to Renewable Energy-1.

A "start" date of 2012 for Renewable Energy-1 is sufficient for purposes of GHG quantification because this measure relies on incentives that generally already exist and solar installations are already occurring throughout the city. Example solar programs currently underway include the California Solar Initiative, power purchase agreement (PPA) financing, SCE solar rebates, and state and federal tax breaks. In addition to the Home Energy Renovation Opportunity (HERO) program. Although the GHG quantification doesn't include solar installations for existing nonresidential buildings constructed during 2013 and 2014, the actual adopted measure will apply to these buildings. Therefore the GHG quantification is conservative in estimating GHG reductions for nonresidential buildings constructed on or before 2012.

Emissions Reductions

Assessor's data for the city was used to determine the total square footage of commercial buildings greater than 25,000 square feet and the total square footage of industrial buildings greater than 100,000 square footage in 2012. These values were multiplied by 12% to determine the building square footage that are rehabilitated and will be installing solar. The total building square footage was combined with the average number of stories presented above to estimate the total roof-space for participating buildings. This value was multiplied by 0.7 to determine the total usable roof-space to install solar PV. Finally, the roof-space value was multiplied by 15.36 kWh produced per square foot of solar PV to determine the annual electricity production of the solar panels.

Carbon neutral sources do not emit GHGs. The kWh affected by this measure would therefore result in a 100% reduction in emissions, relative to BAU conditions. GHG emissions reductions achieved by Renewable Energy-1 were quantified by multiplying the resulting solar electricity production for each city by the appropriate utility emission factors.

Co-Benefit Analysis

The following benefits are expected from implementation of Renewable Energy-1.

Reduced Air Pollution: Generating community electricity through renewable sources would displace a portion of electricity generated by fossil fuels. As such, combustion at regional power stations would be reduced, contributing to cumulative reductions in criteria pollutants.

Waste Reduction: The generation of electricity from fossil fuels (e.g., coal, natural gas) generates a substantial amount of waste including, but not limited to: fly ash, bottom ash, flue gas, and sludge. These products can have detrimental effects on the environment if absorbed into groundwater, soil, and/or biota. The extraction and mining of fossil fuels also generates waste. Increasing renewable energy production would reduce waste created by fossil fuel supplied power.

Energy Diversity and Security: Fuels that are traded in the open market are subject to energy supply constraints and interruptions from political unrest, conflict, and trade embargoes. Centralized power structures (e.g., stations, sub-stations, refineries, ports) may also be targets of energy terrorism. Providing a diversified and domestic energy supply reduces foreign fuel dependency.

Reduced Price Volatility: Energy supply constraints and the uneven global distribution of fossil fuels increase the instability of the energy market. As the demand for global fossil fuels rises, energy prices would likely be subject to fluctuations and frequent price spikes. Renewables would contribute to the diversification of the energy supply mix, thereby buffering the local economy from the volatile global energy market.

Economic Development: Development of renewable energy infrastructure (e.g., solar farms, wind turbines) would create new jobs, taxes, and revenue for the local economy.

Public Health Improvements: Reduced regional air pollution and waste generation would contribute to overall improvements in public health.

Increased Property Values: If renewable infrastcuture is added to Ontario buildings as a result of this measure, property and resale values of those structures may be increased.

Renewable Energy-2: Solar Installation in Existing Single Family Housing [V]

Measure Description

Encourage residents to install rooftop solar using Power Purchase Agreements and other low or zero up-front cost options for installing solar photovoltaic systems. Install solar panels on 22% of existing single-family homes by 2020.

Assumptions

The following assumptions were considered in the evaluation of this measure:

- This measure only affects existing single-family homes (those built before 2013).
- The market penetration rate for existing homes installing solar is 22%.
- The energy generated by solar PV is carbon neutral (California Air Pollution Control Officers Association 2010).
- The average annual electricity generation per solar system is 7,683 kWh (National Renewable Energy Laboratory 2012).
- The amount of electricity generated by the panels will offset electricity provided by the utilities. For example, a system which generates 7,683 kWh in a year will offset 7,683 kWh produced by power plants, and therefore reduce emissions associated with 7,683 kWh of electricity generation.
-

Analysis Details

GHG Analysis

Utilizing electricity generated by solar photovoltaic panels displaces electricity demand that would ordinarily be provided by the utilities. Although SCE purchases a substantial amount of energy from renewable sources, electricity supplied by SCE still represents a source of indirect GHG emissions. Carbon neutral sources, such solar, do not emit GHGs (California Air Pollution Control Officers Association 2010).

BAU Energy Use

The number of homes in 2008 (and their respective energy use) was projected to 2012 in order to determine the number of existing homes participating in this measure. The number of single-family residences in 2012 was estimated by interpolating from the 2008 and 2020 values for the city.

A "start" date of 2012 for Renewable Energy-2 is sufficient for purposes of GHG quantification because this measure relies on incentives that generally already exist and solar installations are already occurring throughout the city. Example solar programs currently underway include the California Solar Initiative, power purchase agreement (PPA) financing, SCE solar rebates, and state and federal tax breaks. In addition to the Home Energy Renovation Opportunity (HERO) program. Although the GHG quantification doesn't include solar installations for existing single-family homes constructed during 2013 and 2014, the actual adopted measure will apply to these homes. Therefore the GHG quantification is conservative in estimating GHG reductions for single-family homes constructed on or before 2012.

Emissions Reductions

The number of single-family homes in 2012 (those that are considered existing) was multiplied by the 22% penetration rate to determine the number of new homes installing solar PV. This number was then multiplied by 7,683 kWh, which is the annual amount of electricity provided by the average solar system in the county (National Renewable Energy Laboratory 2012). This determines the total amount of renewable energy provided by the panels, and offset from the utilities.

Carbon neutral sources do not emit GHGs. The kWh affected by this measure would therefore result in a 100% reduction in emissions, relative to BAU conditions. GHG emissions reductions achieved by Renewable Energy-2 were quantified by multiplying the resulting solar electricity production for the city by the appropriate utility emission factors.

Co-Benefit Analysis

The following benefits are expected from implementation of Renewable Energy-2.

Reduced Air Pollution: Generating community electricity through renewable sources would displace a portion of electricity generated by fossil fuels. As such, combustion at regional power stations would be reduced, contributing to cumulative reductions in criteria pollutants.

Waste Reduction: The generation of electricity from fossil fuels (e.g., coal, natural gas) generates a substantial amount of waste including, but not limited to: fly ash, bottom ash, flue gas, and sludge. These products can have detrimental effects on the environment if absorbed into groundwater, soil, and/or biota. The extraction and mining of fossil fuels also generates waste. Increasing renewable energy production would reduce waste created by fossil fuel supplied power.

Energy Diversity and Security: Fuels that are traded in the open market are subject to energy supply constraints and interruptions from political unrest, conflict, and trade embargoes. Centralized power structures (e.g., stations, sub-stations, refineries, ports) may also be targets of energy terrorism. Providing a diversified and domestic energy supply reduces foreign fuel dependency.

Reduced Price Volatility: Energy supply constraints and the uneven global distribution of fossil fuels increase the instability of the energy market. As the demand for global fossil fuels rises, energy prices would likely be subject to fluctuations and frequent price spikes. Renewables would contribute to the diversification of the energy supply mix, thereby buffering the local economy from the volatile global energy market.

Economic Development: Development of renewable energy infrastructure (e.g., rooftop solar, solar farms, wind turbines) would create new jobs, taxes, and revenue for the local economy.

Public Health Improvements: Reduced regional air pollution and waste generation would contribute to overall improvements in public health.

Increased Property Values: If renewable infrastcuture is added to Ontario buildings as a result of this measure, property and resale values of those structures may be increased.

Renewable Energy-3: Solar Installations for Existing Nonresidential Buildings [V]

Measure Description

Encourage existing businesses (commercial and industrial) to install rooftop solar using Power Purchase Agreements and other low or zero up-front cost options for installing solar photovoltaic systems. Install solar panels on 32% of existing nonresidential buildings by 2020.

Promote and incentivize solar installations on existing nonresidential buildings through partnerships with SCE and other private sector funding sources including SunRun, SolarCity, and other solar lease or PPA companies. This could be supported through non-financial incentives or streamlined permitting. The city of Ontario may also act as a resource for connecting project proponents with funding opportunities.

Assumptions

The following assumptions were considered in the evaluation of this measure:

- 32% of existing commercial/industrial buildings will install solar was.
- The energy generated by solar PV is carbon neutral (California Air Pollution Control Officers Association 2010).
- Based on the participation rate, 12.8 million square feet of commercial space and 8.6 million square feet of industrial space participate in this measure.
- The average number of stories is 1.1 (commercial) and 1.0 (industrial)
- The average percentage of roof space that can install solar is 70%
- The average annual electricity generation per solar system is 1,536 kWh per kW of solar PV installed based on a 5kW system generating 7,683 kWh per year (National Renewable Energy Laboratory 2012).
- Each square foot of solar PV produces 10 watts of electricity, which is equivalent to 15.36 kWh per year (U.S. Department of Energy 2005).
- This measure is equivalent to 137 MW of solar or 13.2 million square feet of solar panels installed.
- Solar can be installed anywhere on the property (including on carports and on parking lot roofs).
- Each solar PV system supplies 15% of a building's total electricity demand.
- The amount of electricity generated by the panels will offset electricity provided by the utilities. For example, a system which generates 7,683 kWh in a year will offset 7,683 kWh produced by power plants, and therefore reduce emissions associated with 7,683 kWh of electricity generation.

Analysis Details

GHG Analysis

Utilizing electricity generated by solar photovoltaic panels displaces electricity demand that would ordinarily be provided by the utilities. Although SCE purchases a substantial amount of energy from renewable sources, electricity supplied by SCE still represents a source of indirect GHG emissions. Carbon neutral sources, such solar, do not emit GHGs (California Air Pollution Control Officers Association 2010).

BAU Energy Use

BAU electricity and natural gas use for nonresidential buildings were used to calculate reductions for this measure. The GHG inventory documents the energy use and assumptions employed for the BAU analysis.

The GHG Inventory quantified electricity and natural gas emissions associated with existing nonresidential facilities in 2008. The 2008 values were projected to 2012 in order to determine electricity and natural gas use and emissions for all existing nonresidential buildings built before 2013, which are subject to Renewable Energy-3.

A "start" date of 2012 for Renewable Energy-3 is sufficient for purposes of GHG quantification because this measure relies on incentives that generally already exist and solar installations are already occurring throughout the city. Example solar programs currently underway include the California Solar Initiative, power purchase agreement (PPA) financing, SCE solar rebates, and state and federal tax breaks. In addition to the Home Energy Renovation Opportunity (HERO) program. Although the GHG quantification doesn't include solar installations for existing nonresidential buildings constructed during 2013 and 2014, the actual adopted measure will apply to these buildings. Therefore the GHG quantification is conservative in estimating GHG reductions for nonresidential buildings constructed on or before 2012.

Emissions Reductions

Assessor's data for the city was used to determine the total commercial and industrial building square footage in 2012. These values were multiplied by the 32% participation rate to determine the building square footage that will be installing solar. The total building square footage was combined with the average number of stories presented above to estimate the total roof-space for participating buildings. This value was multiplied by 0.7 to determine the total usable roof-space to install solar PV. Finally, the roof-space value was multiplied by 15.36 kWh produced per square foot of solar PV to determine the annual electricity production of the solar panels.

Carbon neutral sources do not emit GHGs. The kWh affected by this measure would therefore result in a 100% reduction in emissions, relative to BAU conditions. GHG emissions reductions achieved by Renewable Energy-3 were quantified by multiplying the resulting solar electricity production by the appropriate utility emission factors.

Co-Benefit Analysis

The following benefits are expected from implementation of Renewable Energy-3.

Reduced Air Pollution: Generating community electricity through renewable sources would displace a portion of electricity generated by fossil fuels. As such, combustion at regional power stations would be reduced, contributing to cumulative reductions in criteria pollutants.

Waste Reduction: The generation of electricity from fossil fuels (e.g., coal, natural gas) generates a substantial amount of waste including, but not limited to: fly ash, bottom ash, flue gas, and sludge. These products can have detrimental effects on the environment if absorbed into groundwater, soil, and/or biota. The extraction and mining of fossil fuels also generates waste. Increasing renewable energy production would reduce waste created by fossil fuel supplied power.

Energy Diversity and Security: Fuels that are traded in the open market are subject to energy supply constraints and interruptions from political unrest, conflict, and trade embargoes. Centralized power structures (e.g., stations, sub-stations, refineries, ports) may also be targets of energy terrorism. Providing a diversified and domestic energy supply reduces foreign fuel dependency.

Reduced Price Volatility: Energy supply constraints and the uneven global distribution of fossil fuels increase the instability of the energy market. As the demand for global fossil fuels rises, energy prices would likely be subject to fluctuations and frequent price spikes. Renewables would contribute to the diversification of the energy supply mix, thereby buffering the local economy from the volatile global energy market.

Economic Development: Development of renewable energy infrastructure (e.g., solar farms, wind turbines) would create new jobs, taxes, and revenue for the local economy.

Public Health Improvements: Reduced regional air pollution and waste generation would contribute to overall improvements in public health.

Increased Property Values: If renewable infrastcuture is added to Ontario buildings as a result of this measure, property and resale values of those structures may be increased.

Waste-1: Increased Waste Diversion [M]

Measure Description

Continue to provide public education and collection services to community residents and business. Exceed the waste diversion goals recommended by Assembly Bill 939 and CALGreen by adopting citywide waste goals of at least 75% of waste diversion.

Assumptions

The following assumptions were considered for the quantification of this measure.

- The 2020 BAU waste diversion rate equals the 2006 diversion rate, which is 64% (CALRecycle 2010b).[10]
- Ontario will increase its diversion rate linearly from the 2006 rate to 75% by 2020.

Analysis Details

GHG Analysis

Diversion programs reduce the amount of waste deposited in regional landfills. Because waste generates methane emissions during decomposition, reducing the volume of waste sent to landfills directly reduces GHG emissions. In general, waste diversion rates have risen dramatically since the early 1980s. The U.S. achieved 51% diversion in fiscal year 2009 (U.S. Environmental Protection Agency 2011).

2020 BAU Emissions

The GHG Inventory projected 2020 waste volumes using historic landfill data obtained from CalRecycle. The 2006 diversion rate was assumed to remain constant under 2020 BAU conditions.

Emissions Reductions

Implementation of Waste-1 would increase the BAU diversion rate to 75% by 2020. The amount of waste diverted by material type under BAU conditions was therefore increased by the difference between the BAU diversion rate (64%) and the new diversion rate (75%). GHG emissions that would have been generated by the diverted waste if it had been deposited in regional landfills were quantified using CARB's FOD Model and new waste disposal quantities based on the new 2020 waste diversion goal.

CAPCOA recommends the use of the U.S. Environmental Protection Agency's Waste Reduction Model (WARM) to quantify emissions reductions from diverting landfill waste to composting or recycling but the EPA recommends against using this life-cycle approach for inventories because of the diffuse nature of the emissions and emission reductions within a single WARM emission factor. Consequently, the WARM model was not used to calculate reductions from Waste-1. CARB's FOD Model was used to calculate reductions because it is consistent with the inventory and does not have a lifecycle component.

Co-Benefit Analysis

The following benefits are expected from implementation of Waste-1.

Reduced Air Pollution: The decomposition of landfilled waste emits methane, which can react with other species in the atmosphere to form local smog. By sending less waste to regional landfills, methane emissions would be reduced.

Resource Conservation: Waste that is diverted to recycling centers can be converted into reusable products, thereby reducing the need for raw materials.

[10] Diversion rates for years after 2006 are not available from CALRecycle.

Trans-3: Smart Bus Technologies [V]

Measure Description

Smart Bus Technologies include Automatic Vehicle Location (AVL) systems and real-time passenger information at bus stations. Omnitrans plans to implement these technologies system-wide on all bus routes serving San Bernardino Valley (Omnitrans service area) to enable information sharing, enhance rider services, and attract potential riders. The AVL system has been implemented. The Bus Arrival Prediction Information System (BAPIS) will be installed in two phases. In Phase I, real-time rider information will be available via text messaging, Quick Response (QR), website, Interactive Voice Response (IVR), and mobile phone devices. Implementation completion is slated for December 2012. In Phase II Omnitrans will be installing electronic signs at all major transit hubs and provide General Transit Feed Specification (GTFS) data to the general public to build apps for mobile devices like smartphones and tablet computers. Phase II completion is slated for December 2013 (Kuruppu pers. comm.; Omnitrans 2012).

Assumptions

The following assumptions were considered in the evaluation of this measure:

- The growth rate in Omnitrans ridership from 2008 to 2020 is 0.56% (Onmitrans n.d.).
- Several sources in the literature suggest that these technologies may lead to a 20-50% reduction in wait times at transit stations and a 9-20% saving in fuel consumption. 50% was used as the reduction in wait time because of the system wide deployment proposed by Omnitrans (a sensitivity analysis using a 30% reduction in wait time was also performed to verify this value).
- A 10% saving in fuel consumption was used for Smart Bus technologies.
- Omnitrans' CNG buses had an average fuel economy of 3.3 miles per gallon (GGE) in 2010 which was assumed to remain constant out to 2020 (Federal Transit Administration 2010).
- A transit wait time elasticity of -0.5 was used. This implies that a 10% reduction in transit wait time is expected to result in a 5% increase in ridership (Transportation Research Board 2004).
- All of the additional transit riders switch modes from automobiles to transit.
- Not all additional transit riders previously drove alone (to be conservative in the analysis).
- Average vehicle occupancy (AVO) data was used to estimate the light duty VMT reduction resulting from these additional transit trips (Southern California Association of Governments 2012b).
- Omnitrans system-wide improvements associated with Trans-3 will equally affect each city served by Omnitrans.

Analysis Details

GHG Analysis

GHG emissions are expected to be reduced because the AVL technologies could lead to more fuel efficient bus operations for Omnitrans and the BAPIS technologies could potentially attract more transit riders who may switch modes from automobiles. Omnitrans' Demand Response Services, OmniLink and Access, do not operate on a fixed schedule or route and are not included in this analysis.

Emissions Reductions

Omnitrans provided data on average weekday and annual ridership, vehicle miles, and passenger miles for all routes included in fixed route, fixed schedule service. Weekday values are for 2012, year to date through March and annual values are for 2011. Average weekday trip lengths for 2011 and 2012 are also available. The growth rate in Omnitrans ridership from 2011 to 2012 (year to date) is approximately 8% but the average annual growth rate for the last 10 years (2002–2012) is 0.56%[11]. 0.56% was used to project ridership in 2020.

[11] Based on Omnitrans data available on http://www.omnitrans.org/about/quik-facts.shtml

System-wide VMT reductions were calculated using the following approach:

1. Calculate annual Omnitrans ridership in 2020 using average annual growth rate of 0.56% from 2002-2012. (15,333,567 riders)
2. Calculate annual increase in Omnitrans ridership from improved traveler information and reduced wait times in 2020. (3,833,392)
3. Calculate annual reduction in light duty VMT from additional transit riders switching modes from autos, using -0.5 elasticity and average passenger trip length, assumed same from 2011. (13,676,319)
4. Calculate annual reduction in CNG consumption from increased operational efficiency due to use of AVL systems. (319,280 GGE/gallons)

System-wide GHG emission reductions were calculated using the following approach:

1. Calculate annual emission benefit of light duty VMT reduction using 2020 emission factors for CO_2, CH_4, N_2O, and CO_2 equivalent. (4,253 metric tons of CO_2e)
2. Calculate annual emission benefit of CNG gallons saved using default factors from Climate Registry (2012). (2,286 metric tons of CO_2e)
3. Sum the two sources of emission reduction. (6,539 metric tons of CO_2e)

The system-wide reductions were then apportioned to each city that is served by Omnitrans. Since there are 15 cities served by Omnitrans, Ontario was assigned 436 MT CO_2e of reductions. The actual benefit of this measure will not be distributed evenly, as cities with greater potential for new riders will have more benefit than those with lesser potential. However, due to limited data about the effects of this measure on a city-by-city basis, reductions were apportioned evenly.

A sensitivity analysis assuming 30% reduction in wait time (as opposed to 50%) results in a 0.07% reduction in GHG emissions. A sensitivity analysis assuming 50% reduction in wait time and 30% of additional transit riders switching modes from autos results in a 0.05% reduction in GHG emissions.

Co-Benefit Analysis

The following benefits are expected from implementation of Trans-3.

Reduced Energy Use: More attractive transit would encourage motorists to utilize public transportation instead of private vehicles. As a result, the number of vehicle trips made within the city, and thus gasoline and diesel consumption, would be reduced.

Reduced Air Pollution: Because less petroleum would be consumed by vehicles within each city, air pollutants generated by fossil fuel combustion, including particulate matter, carbon monoxide, sulfur dioxide, and ozone precursors, would be reduced. Likewise, reductions in congestion from fewer vehicles on the roadway network would contribute reductions in emissions generated by vehicle idling.

Public Health Improvements: Reductions in the amount of fuel combusted would result in corresponding reductions in toxic air containments and ozone precursors.

Increased Quality of Life: Increased transit service would help reduce transit passenger travel time and may make public transportation more comfortable and enjoyable. Reductions in the number of vehicle trips may also reduce congestion and travel times.

Trans-6: Idling Ordinance [M]

Measure Description

Adopt an Ordinance that limits idling time for heavy duty trucks (greater than 26,000 gross vehicle weight) to 3 minutes. Support SCAMQD and ARB anti-idling requirements and provide signage in key areas where idling that is not consistent with SCAMQD or ARB requirements might occur. California state law currently requires all heavy duty trucks greater than 10,000 lbs to limit idling to no more than 5 minutes.

Assumptions

The following assumptions were considered in the evaluation of this measure:

- 0.9 gallons of diesel fuel are consumed per hour of idling (U.S. Environmental Protection Agency 2009b)
- 6.32 gallons of diesel fuel are consumed per hour of operation for construction equipment.
- On average, construction equipment spend approximately 29.4% of daily operating time idling (U.S. Environmental Protection Agency 2009b). This value was used to calculate idling fuel use for heavy-duty trucks.
- The average speed of heavy-duty trucks is 59.58 mph (calculated based on 2020 VMT by speed bin from the GHG inventory).
- Trucks emit 0.98 kg CO_2e per mile on average (calculated from the 2020 BAU forecast).
- 10.21 kg of CO_2 is emitted per gallon of diesel fuel combusted (Climate Registry 2012).
- Trucks operate 8 hours per day.
- This measure results in a 40% reduction in idling emissions (the change from 5 minutes to 3 minutes for max idling time)

Analysis Details

GHG Analysis

Idling requires fuel and results in GHG emissions. Regulating idling time would therefore reduce fuel consumption and GHG emissions.

2020 BAU Emissions

BAU emissions from heavy duty truck idling were quantified using the ratio of idle to operating fuel consumption. Fuel consumption for trucks will vary by type. However, according to the EPA, a typical mid-size track-type tractor consumes 0.9 gallon of fuel for every one hour at idle (U.S. Environmental Protection Agency 2009b). Anticipated BAU idling times were estimated using case studies of construction equipment. The EPA (2009a) estimates that on average, construction equipment spend approximately 29% of daily operating time idling. Assuming an average workday of 8 hours, this equates to approximately 139 minutes per day. At a rate of 0.9 gallon of fuel for every one hour at idle, each truck consumes approximately 2.1 gallons of fuel per day for idling.

Total daily operational fuel consumption was estimated to determine the percent of time that heavy-duty trucks spend idling. Assuming trucks travel 59.58 mph on average 8 hours per day and emit 0.98 kg CO_2e per mile on average, trucks emit 58.4 kg CO_2e per hour of operation. Using the emission factor of 10.21 kg of CO_2 per gallon of diesel fuel, trucks consume approximately 5.72 gallons of fuel per hour of operation. At 8 hours per day of operation and 139 minutes of idling per day, the total daily travel fuel consumption for each truck is therefore 32.49 gallons.

Using the calculated fuel consumption values for idling (2.1 gallons) and running (32.49 gallons), trucks spend approximately 6% of their fuel use on idling. This value was multiplied by the total 2020 BAU heavy-duty GHG emissions to determine emissions from idling.

Emissions Reductions

Emission reductions for heavy-duty trucks associated with State-6 (Pavley and LCFS) and State-7 (AB 32 Transportation Reduction Strategies) were subtracted from 2020 BAU heavy-duty truck emissions. This was done in order to determine the emissions from heavy-duty trucks after the implementation of Pavley, LCFS and AB 32 transportation strategies, but before the application of Trans-6.

Implementation of Trans-6 would reduce idling time to no more than 3 minutes at any one time. Although heavy duty trucks idle an estimated 139 minutes today, it is unlikely the idling occurs a single time. The CARB's regulations for heavy duty vehicles (5 minutes) was used a proxy to determine the percent reduction in potential idling emissions from implementation of Trans-6. Reducing idling time from 5 minutes to 3 minutes is a 40% reduction. Emissions savings associated with this measure were therefore calculated by multiplying BAU idling emissions by 0.40.

Co-Benefit Analysis

The following benefits are expected from implementation of Trans-6.

Reduced Energy Use: Trucks idle during rest periods, which requires fuel. Regulating idling time therefore reduces fossil fuel consumption.

Reduced Air Pollution: Reduced idling and fuel combustion would contribute to reductions in toxic air contaminates, ozone precursors, and other inorganic and organic air pollutants.

Public Health Improvements: Truck drivers are exposed to pollutants that cause adverse health effects when they work near idling vehicles. By reducing vehicle idling time, exposure periods would be decreased, which may contribute to long-term health improvements.

Off-Road-1: Idling Ordinance [M]

Measure Description

Adopt an Ordinance that limits idling time for heavy-duty construction equipment beyond CARB or local air district regulations and if not already required as part of CEQA mitigation. This measure will require an idling limit of 3 minutes. Encourage contractors as part of permitting requirements or city contracts to submit a construction vehicle management plan that includes such things as: idling time requirements; requiring hour meters on equipment; documenting the serial number, horsepower, age, and fuel of all onsite equipment.

Assumptions

The following assumptions were considered in the evaluation of this measure:

- 0.9 gallons of diesel fuel are consumed per hour of idling (U.S. Environmental Protection Agency 2009b)
- 6.32 gallons of diesel fuel are consumed per hour of operation for construction equipment.
- On average, construction equipment spend approximately 29.4% of daily operating time idling (U.S. Environmental Protection Agency 2009b)
- This measure results in a 40% reduction in idling emissions (the change from 5 minutes to 3 minutes for max idling time)
-

Analysis Details

GHG Analysis

Equipment idles during rest periods, which requires fuel and results in GHG emissions. Regulating idling time would therefore reduce fuel consumption and GHG emissions.

2020 BAU Emissions

BAU emissions from construction equipment idling were quantified using the ratio of idle to operating fuel consumption. Fuel consumption for off-road equipment will vary by type. However, according to the EPA, a typical mid-size track-type tractor consumes 0.9 gallon of fuel for every one hour at idle (U.S. Environmental Protection Agency 2009b). Based on an URBEMIS2007 model run for a similar equipment piece, approximately 64 kilograms of carbon dioxide are emitted. Assuming 10.21 kilograms of carbon dioxide per gallon of diesel fuel (Climate Registry 2012), 6.28 gallons of fuel are consumed per hour of operation.

CARB does not regulate idling time for off-road equipment. Anticipated BAU idling times were therefore estimated using case studies of construction equipment. The EPA (2009a) estimates that on average, construction equipment spend approximately 29.4% of daily operating time idling. Assuming an average workday of 8 hours, this equates to approximately 141 minutes per day. Based on this assumption, and the estimated gallons of fuel consumed (above), BAU idling emissions were estimated for each city.

Emissions Reductions

Emission reductions associated with State-9 (LCFS for Off-Road Equipment) were subtracted from 2020 BAU construction equipment emissions. This was done in order to determine the emissions from off-road construction equipment after the implementation of the LCFS, before the application of the Off-Road-1.

Implementation of Off-Road-1 would reduce idling time to no more than 3 minutes at any one time. Although construction equipment idles for over 141 minutes today, it is unlikely the idling occurs a single time. The CARB's regulations for heavy duty vehicle (5 minutes) was used a proxy to determine the percent reduction in potential idling emissions from implementation of Off-Road-2. Reducing idling time from 5 minutes to 3 minutes is a 40% reduction. Emissions savings associated with this measure were therefore calculated by multiplying BAU idling emissions by 0.40.

Co-Benefit Analysis

The following benefits are expected from implementation of Off-Road-1.

Reduced Energy Use: Equipment idles during rest periods, which requires fuel. Regulating idling time therefore reduces fossil fuel consumption.

Reduced Air Pollution: Reduced idling and fuel combustion would contribute to reductions in toxic air contaminates, ozone precursors, and other inorganic and organic air pollutants.

Public Health Improvements: Construction workers are exposed to pollutants that cause adverse health effects when they work near idling vehicles. By reducing vehicle idling time, exposure periods would be decreased, which may contribute to long-term health improvements.

Off-Road-2: Electric Landscaping Equipment [V]

Measure Description

This measure supports reductions in gasoline-powered landscaping equipment use and/or reduces the number and operating time of such equipment community-wide. Support landscape equipment replacement programs to replace 75% of all landscaping equipment with electric equipment (945 total pieces of landscaping equipment replaced). This measure could include the following programs for community landscaping equipment:

- Sponsor a lawnmower exchange program that allows residents to trade in their gasoline powered mower for an electric mower at a low or discounted price.
- Provide incentives for electric and more efficient landscaping equipment, such as rebates and subsidies.
- Provide information on financing for this equipment to the community.
- Require new development to place electrical outlets on the outside of buildings to allow for easy access.

The city could also adopt an ordinance that requires 75% of the city's landscaping equipment be electric by 2020 through the programs and provisions listed above. Ontario would work in close cooperation with the air district in drafting an ordinance or developing outreach programs to be consistent with current air district rules and CEQA guidelines.

Assumptions

The following assumptions were considered in the evaluation of this measure:

- 75% of all landscaping equipment community-wide will be electric by 2020.
- The percent emission reductions for electric landscaping equipment (compared to gasoline-powered equipment) in SCE's service area by horsepower is provided below (California Air Pollution Control Officers Association 2010):
  - < 25 horsepower: 49.5%
  - 25-50 horsepower: 72.3%
  - 50-120 horsepower: 72.0%
  - 120-175 horsepower: 71.2%
  - 175-500 horsepower: 70.4%
- This measure applies to the following equipment as modeled in OFFROAD 2007: lawn mowers, chainsaws, leaf blowers, trimmers, shredders, commercial turf equipment, chippers, and other lawn and garden equipment
- Converting diesel landscaping equipment to electric equipment will provide the same percent reduction in GHG emissions for gasoline equipment (it is likely that the reductions for diesel equipment would be greater, since diesel has a higher CO_2 emission factor than gasoline).

Analysis Details

GHG Analysis

Utilizing electric power eliminates 100% of direct GHG emissions from fuel combustion. Indirect emissions from electricity are significantly lower than direct emissions from fuel combustion. Electrifying landscaping vehicles therefore results in a reduction in GHG emissions.

2020 BAU Emissions

The GHG Inventory quantified emissions associated with off-road equipment in 2020 under BAU conditions.

Emissions Reductions

Emission reductions associated with State-9 (LCFS for Off-Road Equipment) were subtracted from 2020 BAU landscaping equipment emissions. This was done in order to determine the emissions from off-road landscaping equipment after the implementation of the LCFS, before the application of the Off-Road-2.

The OFFROAD2007 model calculates vehicle operating emissions by fuel type (e.g., diesel, gasoline) and average horsepower. Model emissions outputs by vehicle class were multiplied by 75% percent for landscaping equipment which is electrified by 2020 and then multiplied by CAPCOA's anticipated percent reduction in GHG emissions for switching to electric power (see assumptions above).

Co-Benefit Analysis

The following benefits are expected from implementation of Off-Road-2.

Reduced Air Pollution: Utilizing electricity in place of gasoline and diesel would reduce local air pollution.

Public Health Improvements: Fossil fuel combustion release several toxic air containments known to cause adverse human health effects. Reductions in the amount of fuel combusted would result in corresponding reductions in toxic air containments. Additionally, reductions in ozone precursors would reduce the formation of smog, which has numerous human and environmental effects, including respiratory irritation and reduced plant productivity.

Increased Quality of Life: Electric equipment is quieter and typically easier to maneuver than diesel- and gasoline-powered equipment.

Agriculture-1: Methane Emissions Reduction for Animal Operations [V]

Measure Description

Support the dairy industry (and other animal operations) to consider existing and new technologies and methods to control emissions from enteric fermentation and manure management and assess the feasibility and cost effectiveness of these technologies. Animal operations should strive to reduce as much methane from manure management as feasible. Captured biogas can also be used in place of natural gas for heating, converted to vehicle fuel, used to replace gasoline and diesel, or combusted in a generator to produce renewable electricity. This measure includes efforts to reduce emissions from both enteric fermentation and manure management, but the GHG quantification is only based on reductions in methane from manure management because technologies to reduce emission from enteric fermentation are still under development.

As a voluntary measure, the City would support dairies (and other animal operations) to consider existing and new technologies to control emissions from enteric fermentation and manure management and assess the feasibility of these technologies. Dairies would be encouraged to explore new technologies and implement feasible manure digestion projects based on their own local conditions and operations. The City would assist in seeking local, regional, state, and/or federal grants to help offset capital costs, linking dairies to new research opportunities, and working with local partners to help assess the feasibility of reduction projects.

This measure also encourages dairies to reuse captured biogas (methane from manure). This biogas could be destroyed on-site, transported for off-site use (e.g., through gas distribution or transmission pipeline), or used to power vehicles. Using captured biogas could potentially offset natural gas use or offroad fuel use (reductions may be achieved in the building energy sector and/or the off-road sector).

Assumptions

The following assumptions were considered for the quantification of this measure.

- 157.06 kg of methane is emitted per head of dairy cattle per year from manure management (California Air Resources Board 2010)
- 73% of dairy cows at dairies with 1,000+ head will be feeding digesters through voluntary action (California Air Resources Board 2008a, pg. I-64)
- The BAU methane capture rate is 0% (i.e., no methane capture)
- The new methane capture rate is 75%
- 25% of methane is destroyed on site (flared) (estimate)
- 75% of methane is used for offsite use energy generation (estimate)
- Efficiency factor for converting methane into electricity is 85% (California Air Pollution Control Officers Association 2010)
- The energy content of biomethane is 1,012 btu per cubic foot (California Air Pollution Control Officers Association 2010)
- Combustion emission factors for biomethane are 52.07 kg CO_2/MMBtu, 0.032 kg CH_4/MMBtu, and 0.0042 kg N_2O/MMBtu (Climate Registry 2012)

Analysis Details

GHG Analysis

Dairies produce large quantities of methane from enteric fermentation and manure management of dairy cows. Capturing this methane, instead of allowing it to be released into the atmosphere, will reduce GHG emissions associated with dairies. Biodigesters recover methane from animal manure through a process called anaerobic digestion. The captured methane can be flared, combusted to produce electricity, or converted to fuel such as natural gas.

2020 BAU Emissions

The GHG Inventory projected 2020 dairy emissions using the number of head of dairy cattle in 2008 and a growth factor obtained for the city.

Emissions Reductions

Implementation of Agriculture-1 would result in the capture of 86% of the methane generated from the manure of 73% of the dairy cows within Ontario. Total BAU emissions from dairy cows were multiplied by 73% and then by 75% (the methane capture rate) to determine the quantity of methane captured.

This measure would also result in the flaring of 25% of the methane captured from dairies and the combustion for electricity of 75% of this methane.

The quantity of methane captured from was multiplied by 75% to determine the quantity of methane combusted for electricity. This was converted to energy units (MMBtu) and then into electricity production using the efficiency factor of 85%. GHG emissions reductions were quantified by multiplying the electricity reduction by the appropriate utility emission factors.

Co-Benefit Analysis

The following benefits are expected from implementation of Agriculture-1.

Reduced Air Pollution: Manure management at dairies emits methane, which can react with other species in the atmosphere to form local smog. By capturing much of this methane, emissions would be reduced. Generating community electricity through renewable sources would displace a portion of electricity generated by fossil fuels. As such, combustion at regional power stations would be reduced, contributing to cumulative reductions in criteria pollutants.

Resource Conservation: Methane can be used to generate electricity or produce other useful fuels, thereby reducing the need for energy.

Reduced Energy Use: This measure would increase the production of renewable electricity, which would reduce the amount of fossil fuels consumed to produce electricity in power plants.

Waste Reduction: The generation of electricity from fossil fuels (e.g., coal, natural gas) generates a substantial amount of waste including, but not limited to: fly ash, bottom ash, flue gas, and sludge. These products can have detrimental effects on the environment if absorbed into groundwater, soil, and/or biota. The extraction and mining of fossil fuels also generates waste. Increasing renewable energy production would reduce waste created by fossil fuel supplied power.

Reduced Price Volatility: Energy supply constraints and the uneven global distribution of fossil fuels increase the instability of the energy market. As the demand for global fossil fuels rises, energy prices would likely be subject to fluctuations and frequent price spikes. Renewables would contribute to the diversification of the energy supply mix, thereby buffering the local economy from the volatile global energy market.

Economic Development: Development of renewable energy infrastructure (e.g., anaerobic digesters) would create new jobs, taxes, and revenue for the local economy.

Water-1: Water Conservation for Existing Buildings [V]

Measure Description

Implement a program to renovate existing buildings to a higher level of water efficiency. Require 25% of existing buildings within the community to achieve a 25% reduction in water use. This measure will reduce both indoor and outdoor water use. Rebate programs can help promote installation of water-efficient plumbing fixtures. The program could address:

- Development plans to ensure water conservation techniques are used (e.g., rain barrels, drought tolerant landscape).
- Water efficiency upgrades as a condition of issuing permits for renovations or additions of existing buildings.
- Adopt water conservation pricing, such as tiered rate structures, to encourage efficient water use.

Incentives for projects that demonstrate significant water conservation through use of innovative water consumption technologies.

Assumptions

The following assumptions were considered for the quantification of this measure:

- The market penetration rate for buildings (residential and commercial) performing water efficiency retrofits is 27%.
- A 25% reduction in total water use is obtained by this measure.
- 57% of total residential water use is for outdoor use / landscaping; the remaining 43% is used indoors (ConSol 2010).
- 35% of total nonresidential water use is for outdoor use / landscaping; the remaining 65% is used indoors (Yudelson 2010).
- 33% of total residential indoor water use is hot water (Aquacraft, Inc. 2014).
- 22% of total commercial indoor water use is hot water (Yudelson 2010, U.S. Department of Energy 2012).
- Heating a gallon of hot water requires 0.0098 therms of natural gas or 0.19 kWh of electricity (ICLEI Local Governments for Sustainability 2010).
- 10.5% homes have electric water heaters (1.3 million households out of 12.4 million households used electricity to heat water in 2005 in California) (Energy Information Administration 2009, Table WH2).
- 40% of commercial buildings have electric heaters (2,771 million square feet out of 6,947 million square feet use electricity to heat water in 2003 in the Pacific Census Region) (Energy Information Administration 2009, Table B32).

Analysis Details

GHG Analysis

Water use contributes to GHG emissions indirectly, via the production of the electricity that is used to pump, treat, and distribute the water. Installing low-flow or high-efficiency water fixtures in buildings reduces water demand, energy demand, and associated indirect GHG emissions.

California homes and businesses consume a significant amount of water through indoor plumbing needs and outdoor irrigation. ConSol estimates that an average three-bedroom home uses 174,000 gallons of water each year (ConSol 2010). A large portion of water use can be attributed to inefficient fixtures (e.g., showerheads, toilets). Recognizing that water uses a great deal of electricity to pump, treat, and transport, achieving this goal would not only reduce electricity consumption, but avoid GHG emissions and conserve water.

Emissions Reductions

Estimated water use in 2012 was calculated by linearly interpolating 2008 water use and 2020 estimated water use for the residential and nonresidential sectors to determine water use from existing buildings. A "start" date of 2012 for Water-1 is sufficient for purposes of GHG quantification because this measure relies on incentives that generally already exist and water efficiency retrofits are already occurring throughout the city. Example programs currently underway which include water efficiency upgrades include funding and grants from the California Department of Water Resources, water use efficiency programs and rebates from the Inland Empire Utilities Agency (IEUA), and federal and state funding for water efficiency programs. Although the GHG quantification doesn't include water efficiency renovations for existing buildings constructed during 2013 and 2014, the actual adopted measure will apply to these buildings. Therefore the GHG quantification is conservative in estimating GHG reductions for nonresidential buildings constructed on or before 2012.

The 2012 water use values were then multiplied by 27% to determine the quantity of water subject to this measure and then by 25% to determine the water use reductions.

Water use reductions were then split into indoor and outdoor water use reductions based on the percentages presented above for residential and nonresidential uses. Indoor water use reductions were used to determine energy savings from reduced water heating. Total water use reductions (indoor and outdoor) were used to determine energy savings from reduced water conveyance, treatment, distribution, and wastewater treatment.

Water use savings result in energy use reductions for three different categories: reduced water conveyance, treatment, distribution, and wastewater treatment; reduced electricity used for water heating; and reduced natural gas used for water heating.

Electricity savings from reduced water conveyance, treatment, distribution, and wastewater treatment were quantified by multiplying the anticipated water reductions by the appropriate energy-intensities.

Electricity savings from reduced water heating were quantified as follows:

a) Residential electricity savings (kWh) = gallons of water saved * 33% hot water * 10.5% of homes with electric water heaters * 0.19 kWh to heat a gallon of water.

b) Nonresidential electricity savings (kWh) = gallons of water saved * 22% hot water * 40% of commercial buildings with electric water heaters * 0.19 kWh to heat a gallon of water.

Natural gas savings from reduced water heating were quantified as follows:

a) Residential natural gas savings (therms) = gallons of water saved * 33% hot water * 89.5% of homes with natural gas water heaters * 0.0098 therms to heat a gallon of water.

b) Nonresidential natural gas savings (therms) = gallons of water saved * 22% hot water * 60% of commercial buildings with natural gas water heaters * 0.19 kWh to heat a gallon of water.

GHG savings from electricity and natural gas reductions were then calculated by multiplying the energy reductions by the appropriate utility emission factors.

Co-Benefit Analysis

The following benefits are expected from implementation of Water-1.

Resource Conservation: Reduced water consumption would help conserve freshwater resources.

Reduced Energy Use: Water uses a great deal of electricity to pump, treat, and transport. Likewise, water consumed during showers, dish washing, and clothes washing require electricity and natural gas to heat the water to a comfortable temperature. Consequently, reductions in water use would reduce energy consumption from pumping, treatment, transporting, and heating.

Reduced Air Pollution: Reduced electricity use would contribute to reductions in regional air pollution.

Increased Property Values: Energy-efficient bulidings have higher property values and resale prices than less efficient buildings.

Water-2: Outdoor Irrigation Monitoring and Management System [V]

Measure Description

Install water monitoring and management systems (Smart controllers, etc.) across the community to reduce irrigation water needs and reduce the City's total community-wide water consumption by 10% by 2020. Additional outdoor water conservation can be achieved through the following implementation strategies:

- Evaluate existing landscaping and options to convert reflective and impervious surfaces to landscaping, and install or replace vegetation with drought-tolerant, low-maintenance native species or edible landscaping that can also provide shade and reduce heat-island effects.
- Participate in and support regional programs and projects that target the improvement and conservation of the region's groundwater and surface water supply. Also consider programs to collect stormwater for landscape watering.

Assumptions

The assumptions described in Water-1 were used to quantify water, energy, GHG emissions reductions associated with this measure. The following additional assumptions were used:

- This measure will result in a 10% reduction in total 2020 BAU water consumption through the reduction of outdoor water use.

Analysis Details

GHG Analysis

Water use contributes to GHG emissions indirectly, via the production of the electricity that is used to pump, treat, and distribute the water. California homes and businesses consume a significant amount of water through outdoor water use, which includes landscape irrigation. Installing a water monitoring and management system reduces water consumption and the associated indirect GHG emissions. Achieving this goal would not only reduce electricity consumption, but avoid GHG emissions and conserve water.

Emissions Reductions

The following steps were performed to calculate water savings:

a) 2020 water use reductions from Water-1 were subtracted from the BAU 2020 water use in order to determine the amount of water use after implementation of Water-1.

b) The percent reduction in water use rates due to the implementation of Water-2 was calculated by multiplying the resulting water use by 10%.

c) Water savings were calculated by source (SWP, groundwater, etc.) and sector (residential and commercial) using the assumptions identified in Water-1.

d) Hot water savings were calculated (residential and commercial) using the assumptions identified in Water-1.

e) Electricity and natural gas reductions in the building energy sector (for water heating) and the water conveyance sector (conveyance, treatment, etc.) associated with the reduced water use were then calculated using the assumptions identified in Water-1.

GHG savings from electricity reductions were then calculated by multiplying the energy reductions by the appropriate utility emission factors.

Co-Benefit Analysis

The following benefits are expected from implementation of Water-2.

 **Resource Conservation:** Water monitoring and management systems would reduce water consumption and help conserve freshwater resources.

 **Reduced Energy Use:** Water uses a great deal of electricity to pump, treat, and transport. Consequently, reductions in water use would reduce energy consumption from pumping, treatment, and transporting.

 **Reduced Air Pollution:** Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).

 **Increased Property Values:** Energy-efficient buildings have higher property values and resale prices than less efficient buildings.

Water-4: Senate Bill X7-7 The Water Conservation Act of 2009 [M]

Measure Description

Meet (or exceed) the State-established per capita water use reduction goal as identified by Senate Bill (SB) X7-7 for 2020. SB X7-7 was enacted in November 2009 and requires urban water agencies throughout California to increase conservation to achieve a statewide goal of a 20% reduction in urban per capita use (compared to nominal 2005 levels) by December 31, 2020 (referred to as the "20X2020 goal"). Each urban water retailer in the state subject to the law has established a 2020 per-capita urban water use target to meet this goal. The City of Ontario Municipal Utilities Company (Utilities Company) is the water retailer that serves the city of Ontario.

The Utilities Company will implement water conservation measures according to their 2010 Urban Water Management Plan (City of Ontario 2011). The city will work with the Utilities Company as necessary to reduce per-capita water use by 2020. Implementation depends on the specific urban water management plans, but would be gradual through 2020 as new buildings are constructed with water-efficient fixtures and other conservation measures are put into place.

This strategy will reduce embodied energy use associated with water conveyance and treatment, along with fugitive emissions associated with wastewater treatment processes resulting from treatment of wastewater generated within the city.

Assumptions

The assumptions described in Water-1 were used to quantify water, energy, GHG emissions reductions associated with this measure. The following additional assumptions were used:

- 20% reduction in total water use obtained by this measure.

Analysis Details

GHG Analysis

Water use contributes to GHG emissions indirectly, via the production of the electricity that is used to pump, treat, and distribute the water. Installing low-flow or high-efficiency water fixtures in buildings reduces water demand, energy demand, and associated indirect GHG emissions.

California homes and businesses consume a significant amount of water through indoor plumbing needs and outdoor irrigation. ConSol estimates that an average three-bedroom home uses 174,000 gallons of water each year (ConSol 2010). A large portion of water use can be attributed to inefficient fixtures (e.g., showerheads, toilets). Recognizing that water uses a great deal of electricity to pump, treat, and transport, the state adopted SB X7-7, which requires a 20% reduction in urban per capita use by December 31, 2020 (20X2020 goal). Achieving this goal would not only reduce electricity consumption, but avoid GHG emissions and conserve water.

Baseline Emissions and Emissions Reductions

Each urban water retailer in the county has adopted a 2010 Urban Water Management Plan (UWMP). Each plan establishes a 2020 urban water use target for the retailer's service area. These targets vary by city and depend on the baseline per-capita water use rate identified in each UWMP. These targets represent the level of water consumption needed to achieve the 20X2020 goal for each water retailer.

The Ontario Municipal Utilities Company (OMUC) is the water retailer that serves the city of Ontario. The baseline per-capita water use rates for OMUC is 248 gallons per capita per day (gpcd) and the per-capita water use rate target is 198.4 gpcd (City of Ontario 2011). This represents a reduction in per-capita water use of 20%, consistent with most UWMPs to comply with SB X7-7.

The following steps were performed to calculate water savings:

a) 2020 water use reductions from Water-1 and Water-2 were subtracted from the BAU 2020 water use in order to determine the percent reduction in water use already achieved through these measures.

b) The percent reduction in per-capita water use rates due to the implementation of SB X7-7 was calculated using the baseline and target per-capita water use values from the 2010 UWMP for the Ontario Municipal Utilities Company. This value is 20%.

c) The water use percent reductions from Water-1 and Water-2 do not exceed the SB X7-7 percent reduction from 2020 BAU water use. Therefore, the water use reductions achieved by Water-4 are equal to the amount of additional water reductions needed to achieve the SB X7-7 per-capita water use targets.

d) Water savings were calculated by source (SWP, groundwater, etc.) and sector (residential, commercial, indoor, outdoor) using the assumptions identified in Water-1.

e) Hot water savings were calculated (residential and commercial) using the assumptions identified in Water-1above.

f) Electricity and natural gas reductions in the building energy sector (for water heating) and the water conveyance sector (conveyance, treatment, etc.) associated with the reduced water use were then calculated using the assumptions identified in Water-1 above.

g) Wastewater treatment emission reductions associated with Water-4, taking into account reductions from Water-1 and Water-2, were then calculated.

GHG savings from electricity reductions were then calculated by multiplying the energy reductions by the appropriate utility emission factors.

Co-Benefit Analysis

The following benefits are expected from implementation of Water-4.

Resource Conservation: Reduced water consumption would help conserve freshwater resources.

Reduced Energy Use: Water uses a great deal of electricity to pump, treat, and transport. Consequently, reductions in water use would reduce electricity consumption.

Reduced Air Pollution: Reduced electricity use would contribute to reductions in regional air pollution.

Increased Property Values: Energy-efficient bulidings have higher property values and resale prices than less efficient buildings.

Misc-3: Shade Tree Planting [CITY][12]

Measure Description

Establish a city-wide shade tree planting goal. Promote the planting of shade trees and establish shade tree guidelines and specifications. Plant 1,000 trees per year from 2012–2020 for a total of 9,000 trees by 2020 community wide.

Possible implementation mechanisms might include:

- Establishing guidelines for tree planting based on the land use (residential, commercial, parking lots, etc.).
- Establishing guidelines for tree types based on species size, branching patterns, whether deciduous or evergreen, whether roots are invasive, etc.
- Establishing tree guidelines for placement, including distance from structures, density of planting, and orientation relative to structures and the sun.
- A requirement to account for trees removed and planted as part of new construction and/or establishing a goal and funding source for new trees planted on city property.
- To maximize GHG and other environmental benefits, new shade trees would be targeted to the downtown and urban areas.

This measure will reduce energy consumption and associated GHG emissions in the building energy sector by reducing the cooling and heading load of buildings shaded by trees.

Assumptions

The following assumptions were considered for the quantification of this measure.

- Tree planting programs begin in 2012. 1,000 shade trees will be planted per year.
- The following seven tree species will be planted based on the Ontario List of Trees for Streetscape: Chinese flame tree, tulip tree, southern magnolia, canary island pine, Chinese pistache, London plane tree, and the fern pine.
- The 1,000 new trees planted per year were evenly distributed among these tree species. This means that 143 new trees of each of the seven tree species listed above will be planted per year.
- The U.S. Tree Carbon Calculator was used to determine energy savings from shade trees (U. S. Forest Service 2011). The following model inputs were used:

Input Category	Value
Climate Zone	1 (North and Central Coast)
Tree Age	2 years
Tree azimuth	1 (north, default)
Tree distance Class	3 (far, default)
Building vintage	2 (1950-1980, default)
Air conditioning Equipment	1 (central air/heat pump, default)
Heating equipment	1 (natural gas, default)

- Carbon sequestration was not considered.

Analysis Details

GHG Analysis

Trees planted adjacent to buildings provide shade, which cools buildings and reduces the need for summer-time air conditioning use. As a result, less electricity is consumed. Shade trees also reduce building heading loads, reducing natural gas consumption. The energy reductions and associated GHG benefits achieved from tree planting would vary based on the species, age, and size of tree planted.

Carbon sequestration benefits from new trees were not considered because the BAU inventory does not have a BAU assessment of carbon sequestration for the city.

[12] Emissions reductions associated with reduced electricity for heating and cooling as a result of reducing the heat island effect will be achieved in the building energy sector. However, these emissions reductions are reported as part of Misc-1 as they are a direct result of tree-planting programs.

A "start" date of 2012 for Misc-3 is sufficient for purposes of GHG quantification because the city has been planting shade trees before the implementation of this measure. The city may also plant more than 1,000 trees per year in order to meet the 9,000 new tree goal by 2020 if tree planting in 2012 and 2013 is less than 1,000 per year. New developments are also likely planting trees as part of their development.

Emissions Reductions

The tree species listed above were matched to the closest tree species in the Tree Carbon Calculator (U.S. Forest Service 2011). The calculator was run for each tree species with the inputs listed above to determine annual electricity and natural gas savings from reductions in building heating and cooling associated with shade trees. Energy savings vary based on the tree age as the trees grow, and this variation was factored into the analysis. For example, a 2-year old tree planted in 2012 will be 3 years old in 2013, 4 years old in 2014, etc. The energy savings for a 2-year old tree was used for the first 1,000 trees planted in 2012, the energy savings for a 3-year old tree was used for the second 1,000 trees planted in 2013, etc. for each year until 2020.

GHG savings from electricity reductions were then calculated by multiplying the energy reductions by the appropriate utility emission factors.

Co-Benefit Analysis

The following benefits are expected from implementation of Misc-3.

Reduced Energy Use: Trees planted adjacent to buildings shade, which cools buildings and reduces the need for summer-time air conditioning use. As a result, less electricity is consumed.

Reduced Air Pollution: Reduced electricity use would contribute to reductions in regional air pollution. Trees planted adjacent to congested roadways may also help filter particulate matter and other local pollutants.

Reduced Urban Heat Island Effect: Urban heat isalnd effect occurs when the ambient temperature in urban areas increases as a result of high energy consumption (e.g., air conditioning use during the summertime). Trees provide shade, which reduces the cooling load of buildings and helps mitigate the urban heat island effect.

Increased Quality of Life: Trees improve the aesthetic quality of buildings, as well as reduce stormwater runoff during periods of heavy rain.

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C.7 References for Appendix C

C.7.1 Printed

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C.7.2 Personal Communication

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